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Human and Animal Encephalomyelitis

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Venereal Disease Control

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The Development of Public Health in Canada

A review of the history and organization of public health in the provinces of Canada, with an outline of the present organization of the National Health Section of the Federal Department of Pensions and National Health.

Contributors

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Clinical Aspects of an Epidemic of Human Encephalomyelitis in Saskatchewan in 1938*

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BETWEEN June 4 and October 15, 1938, in the State of Massachusetts, 248 horses developed encephalomyelitis, of which 90 per cent died. In the same area from August 12 to October 15, forty-six cases of human encephalitis developed, the peak being reached between August 27 and September 10; thirty-three died, and of these, eight were fatal proved cases of equine encephalomyelitis virus infection. The association of the equine to the human malady was established by Fothergill and his associates at Harvard University and by Webster and Wright at the Rockefeller Institute for Medical Research.

While this was going on in Massachusetts, a situation similar in many respects was taking place in south Saskatchewan, for equine encephalomyelitis was decimating its horse population. About the same time, some of the medical profession, particularly in Regina and Weyburn, were puzzled by the appearance of an epidemic form of encephalitis the course of which was strikingly similar to that of the St. Louis encephalitis epidemic of 1933. It was but natural that from the first, we, who were seeing these cases, should associate them with the equine epidemic. Even a few of the patients stated that their heads were going round and round, much as their sick horses had done in their barnyards. Was it just a coincidence that in two such widely separated districts as Massachusetts and Southern Saskatchewan similar epidemics, differing in virulence only, should develop at almost an identical time, or could there be a common etiological factor? The relationship of the human epidemic to the equine was subsequently established by the work of Dr. J. S. Fulton, head of the Animal Diseases Laboratory at the University of Saskatchewan. The following is an outline of the epidemiological and clinical data relating to the cases, twenty-nine in number.

**Presented at a joint session of the Canadian Public Health Association (twenty-ninth annual meeting) and the Manitoba Medical Association, Winnipeg, Man., September 1940.*

Figure 1 presents the geographical distribution of the cases. It is to be noted that the cities of Regina and Weyburn were central to the cases, although the majority came from farms and small adjacent centres. The youngest case was two months and the oldest seventy-two years, and no age group was particularly involved. Thirteen of the cases were females and sixteen were males. Seven cases occurred before the age of twelve. Of the remaining twenty-two, seventeen were farmers. The first case appeared July 20 and the last September 12, the peak being reached between August 15 and August 25. There were four deaths, eighteen complete recoveries, and seven incomplete recoveries.

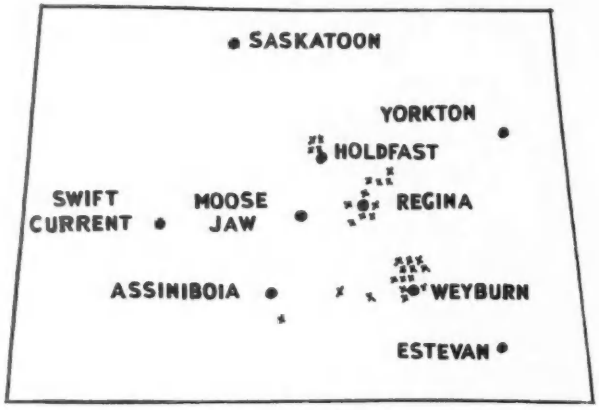

FIGURE 1

Geographical Distribution of Cases of Human Encephalomyelitis, Saskatchewan, 1938.

Fourteen cases were classified as severe, ten as moderate, and five as mild. That there were abortive cases is attested by the statements from several sources to the effect that neighbouring farmers were ill for a few days with persistent headache and malaise. There were no instances of two cases in a family.

SYMPTOMATOLOGY

The clinical course in most instances was characterized by abrupt onset with high temperature, pains and aches and a feeling of malaise. Some described it as an attack of "flu". Signs of upper respiratory infections or of sore throats were not noted. At first typhoid fever was thought of because of the high fever, leukopenia, and delirium. A spinal-fluid examination and the more deep-seated involvement of the central nervous system soon caused the malady to be correctly diagnosed. High temperature, headache, malaise, pains and aches with mental sluggishness were common to most. Headache should be stressed as it appeared in nearly all the cases and was often excrutiating. One case, a boy of twelve, had no headache but considerable backache was present. His mind was perfectly clear and he sat erect, reading, with his back as stiff as a poker. His cell-count

was 114 but he was otherwise not sick except for shooting pains in his chest, legs and abdomen. Case no. 6 illustrates the average case.

Mc. Eleven years. Female. Onset with headache, neck rigidity, and temperature 105 on second day, pulse 110-120. Positive Kernig; mental confusion; photophobia. Two cell counts, 103-183. Lymphocytes 81 per cent. Globulin increased. Reducing bodies normal. White cell count 8500. Temperature dropped eighth day and symptoms abated except for mental confusion and tremor. Treated by sulfanilamide with no effect. Repeated lumbar punctures performed to relieve pressure. Given intravenous injections of 50 per cent glucose and continuous intravenous glucose when food was not taken. Also blood transfusion given. Discharged fourth week completely cured, mentally normal. Two years later child normal in every respect.

Neck rigidity and Kernig's sign were nearly always demonstrable, and reflexes were mostly exaggerated although a few were normal or absent. Eye symptoms so commonly seen in the Economo type were rare although photophobia was present in about half the cases. Nystagmus appeared in a few cases, as did difficulty in swallowing and speaking. Mental lethargy gave way to irritability in some and one man, following his acute stage, spent much of his time crying for no reason. Four or five had convulsions and about one-half exhibited muscular twitchings and tremors. Vertigo was common and persisted into convalescence in a few cases. Anorexia, nausea and vomiting were common. Many complained of abdominal cramps and of shooting pains throughout the chest and abdomen. The tongue was usually furred and diarrhoea appeared in a few although the majority were constipated. Several complained of difficulty in urinating. The pulse, even with temperature as high as 105, tended to range under 120. The spinal fluid was always at some time under pressure, about 20 M.M. of mercury. Globulin was usually increased with reducing bodies normal, two being slightly increased. The spinal fluid cell count ranged from 30 to 300, lymphocytes predominating, the percentage ranging about eighty. The white blood count ranged around eight to fifteen thousand, a few showing a slight leukocytosis but more a leukopenia. Cultures done on spinal fluid were consistently sterile. Urines in quite a few cases demonstrated the presence of a mild to moderate nephritis but otherwise there were no complications. As mentioned, the average acute onset was one week and the average duration of illness about three weeks. In some cases convalescence was delayed and these were incomplete recoveries, all of whom manifested some form of paralysis, mental confusion, or difficulty in speaking, walking etc.

The diagnosis was not difficult after a few cases had been seen. The knowledge of an epidemic at this particular season caused a tentative diagnosis of encephalomyelitis to be made and such was always confirmed by clinical and laboratory study in hospital. As was suggested, typhoid fever and influenza were temporarily considered. Acute poliomyelitis and tuberculous meningitis had also to be considered. A few cases in whom there was no apparent acute onset had to be diagnosed on presumptive grounds. No doubt there have been some missed cases, particularly in children. Case no. 2 illustrates such cases.

Joan D. First seen in October 1939 at age of 18 months because of inability to use legs. Examination revealed both legs with flaccid paralysis from hips down, no sensory disturb-

ances, bladder and bowel control, and mentality normal. History of having visited friend who had encephalomyelitis at Weyburn in August 1938. Child's blood sent to Dr. Fulton's laboratory was found to neutralize fully the virus of encephalomyelitis.

There were four deaths, giving a mortality rate of 12 per cent. These deaths included an infant of three months (diagnosis confirmed by autopsy) and three males aged 21, 23, and 35 years. Two of the latter were fulminating cases, one dying on the fourth and one on the seventh day of illness. The following is a summary of case no. 13 which came to autopsy at the Regina General Hospital.

K.Z. Age 23 years. Country school teacher. Complained of severe frontal headache, high temperature, photophobia and tremor for one week before death. Admitted to hospital sixth day of illness semi-comatose. Spinal fluid 30 M.M. of Hg. Cell count 410. Globulin X. Died following day with temperature 106.4. Autopsy; microscopic sections taken at all levels through central nervous system showed evidence of recent non-suppurative inflammation. Cuffing of small vessels with lymphocytes was seen in both cerebral and spinal cord and there was a patchy infiltration throughout with lymphocytes. Many of motor neurons in cortex and cord were seen to be degenerating. The disease process appeared to be an acute encephalitis or polio-encephalitis.

Of the twenty-five recoveries, seven were incomplete. Two of these were children who showed signs of residual paralysis and five were adults who showed varying degrees of mental confusion, amnesia, muscular weakness and tremors, unsteady gait, etc. Of these two have since completely recovered, one has not been heard from and two have residual effects. One child, however, not seen in the acute stage, has been added to the list because of residual paralysis. The residue may now be classified as follows:

No. 2. Child. 2½ years. Flaccid paralysis of both legs. Recovering slowly. Mentally bright.
No. 3. Child. 3½ years. Formerly hemiplegia. Now recovering nicely and able to walk.
No. 5. Child. 6 years. Paralysis of left leg. Recovering.
No. 11. Adult. 23 years. Disseminated sclerosis.
No. 26. Adult. 55 years. Mental confusion and dizziness.

TREATMENT

Treatment was entirely symptomatic. Repeated lumbar punctures were made to relieve pressure as well as to permit of further study. Restraint was necessary in some cases. Sedatives were used frequently, barbiturates being of value. Repeated intravenous injections with 50 per cent glucose were given in the more acute types. Stuporous cases were given glucose continuously by intravenous injection and a few were given blood transfusions. Convalescent serum was given in one case with uncertain results. Sulphanilamide was tried but it did not control the fever and was considered valueless.

SUMMARY

In the late summer of 1938 there was an epidemic of equine encephalomyelitis in Southern Saskatchewan. At about the same time there were twenty-

nine cases of human encephalomyelitis with their highest incidence between August 15 and August 25.

Four patients died, eighteen recovered completely, and seven recovered partially.

Two years later there were five cases with residual effects, two adults and three children, but most of these appeared to be showing continued improvement.

ACKNOWLEDGMENT

I would like to acknowledge my thanks to Dr. J. S. Fulton of the University of Saskatchewan; Dr. D. F. Moore, pathologist, Regina General Hospital; Doctors Good, McGillivray, Kanee, and Bruser of Weyburn, Dr. Griffith of Holdfast, and my colleagues of Regina who helped in making this presentation; and Dr. R. O. Davison, Deputy Minister of Public Health, Regina.

Relation of Equine Encephalomyelitis to the Epidemic of Human Encephalitis in Saskatchewan in 1938*

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SINCE publishing a report (1) describing two outbreaks of equine encephalomyelitis occurring in Saskatchewan during the summers of 1935 and 1937, a much more extensive epidemic has been experienced, which commenced in June 1938 and before subsiding resulted in the loss of some 15,000 horses. The first two outbreaks referred to followed closely epidemics in the northern states of the Union and Manitoba, whence the disease evidently spread into southeastern Saskatchewan. In 1935, more than half of the province became involved, leaving only the northwest free from infection. This territory, however, was invaded in 1937; in fact, in that year cases were recognized throughout most of the province.

In each of these outbreaks there was a definite primary focus of infection from which the disease spread, advancing with an almost solid front from day to day. Occasionally cases, and even minor outbreaks, would occur ahead of the advancing line, but definitely the spread was from the original focus. In marked contrast to this manner of spread, the epidemic of 1938 appeared spontaneously in all parts of the province, the first cases being reported the same day several hundred miles apart. Within a week the outbreak was at its height, and although subsiding in about a month's time, cases continued to develop until the advent of frosts late in the fall.

Although equine encephalomyelitis was not recognized as such until 1935, the disease has no doubt been common to the province for many years, appearing endemically in certain districts periodically, but described as cerebro-spinal meningitis, forage poisoning, or blind staggers, and, in some instances, being confused with botulism. It is interesting to note that these isolated cases and minor outbreaks which occurred in the past appeared to produce a certain degree of protection. These cases for the most part were confined to very definite areas, and although some cases did develop in these sections during the extensive outbreaks since 1935, the disease was not so prevalent, nor the mortality rate so high, as in districts which had previously been free from infection.

Virus Isolation

In 1935, early in the first epidemic, we isolated the virus from the brains of

*Presented at a joint session of the Canadian Public Health Association (twenty-ninth annual meeting) and the Manitoba Medical Association, Winnipeg, Man., September 1940.

field cases destroyed early in the course of the disease. Isolation was then a matter of considerable difficulty, and our first attempts failed, but once the method had been established it has been isolated consistently; and later when the chick-embryo method for isolation of the virus was developed the procedure became relatively simple. Virus has also been isolated from horses during the succeeding outbreaks, which in each case proved to be of the Western type.

In horses it would appear that the concentration of virus varies in different parts, the content being greater in the medulla; in fact, on more than one occasion its demonstration failed in other parts of the brain, while from the medulla it was readily isolated. The titre of virus-carrying material is greatly reduced by filtration, in some instances to about half of that shown by the non-filtered tissue; filtration therefore greatly reduces the chance of securing virus from new material, and should be avoided if possible.

Experiments show also that while the virus is found in the blood in the early stages of the disease, its presence there is relatively short as it becomes bound to the tissue of the central nervous system and so disappears from the circulation.

First isolation of virus is more readily accomplished by embryo rather than by guinea-pig inoculations, the virulence or concentration being rapidly increased by cultivation in embryonic tissue. Virus propagated on brain may have a titre of not more than one in one hundred thousand, whereas the same virus after several embryo passages may show a titre of one in one million. Another advantage of using embryos is the fact that contaminated material may be used, the contaminating organisms apparently not interfering with virus development. After several embryo transfers the virus is usually firmly established and filtration can be carried out without danger of losing the virus.

TRANSMISSION

Since equine encephalomyelitis is strictly a seasonal disease occurring during the fly season, it has been generally accepted that biting flies have something to do with its spread. This theory has been greatly strengthened by the work of Kelser (2) and Madsen, Knowlton and Rowe (3), who have shown that mosquitoes are capable of transferring the virus from infected to healthy experimental animals. In spite of these facts, the first two epidemics in Saskatchewan originated in an area which had been dry for months and absolutely free from mosquitoes for weeks before the appearance of the disease. As mentioned in the previous report (1), the only biting fly common in this section was the stable fly, *Stomoxys calcitrans*, and these insects were particularly numerous, especially during the 1937 outbreak. Apart from this observation, there is no direct evidence connecting this fly with the spread of the disease.

Neither moisture nor its lack seems to have any important bearing on the spread of the disease; nor has the nature of the country through which it may traverse. As already mentioned, the first two outbreaks commenced on the plains of the south, which were exceedingly dry, but the spread was rapid into the rolling and bush land of the north where rainfall was well above normal.

From the foregoing it would appear that there is no correlation between the incidence of the disease, the presence or absence of mosquitoes, amount of rainfall, or topography of the country; in fact, we must admit total ignorance of how the disease is spread from infected to healthy animals, or how the virus is carried over from year to year.

SUSCEPTIBILITY

Although statistics are meagre, it would appear that there is no relationship between age, sex or breed, and susceptibility to infection. One was impressed, however, with the irregular distribution of the disease in practically every affected stud although all animals in it appeared to be exposed to identical conditions. This was particularly noticeable during the first Saskatchewan outbreak, when, although the disease appeared on most farms in certain areas, seldom did more than one or two horses become infected on any one farm. It was also true that when more than one case did develop, they occurred almost simultaneously, usually not more than two to three days apart, suggesting that the disease was acquired from a common source rather than being transferred from one animal to another. That the disease did not spread further when once it gained access to a stud was surprising, since little or no attempt was made to segregate the sick or take the usually accepted precautionary measures. In many instances, sick and healthy horses were allowed to run at large throughout the season. That this freedom from disease was not due to individual immunity is shown by the fact that some horses which remained well during the first epidemic proved to be highly susceptible during the succeeding outbreaks, many contracting the disease and succumbing as a result. This was also confirmed experimentally.

After the 1935 epidemic was over, work was undertaken to determine if horses which had escaped infection possessed neutralizing bodies for the encephalomyelitis virus; and although a great many blood samples were tested, results obtained were entirely negative. This would indicate that the freedom of these animals from the disease was due simply to accidental escape from adequate infection. This is not difficult to understand if the generally accepted view is correct, that the virus remains free for a very short time after infection before being localized in the brain tissue, and removed from the general circulation.

ENCEPHALITIS IN MAN

During the years in which the equine disease was epidemic in Saskatchewan, physicians, particularly in the southern part of the province, reported an increasing number of cases of acute encephalitis in humans until in 1938, when it reached epidemic proportions. Since most of the human infections occurred in areas where equine encephalomyelitis had been extremely prevalent, the possibility of both diseases having a common causative agent was considered. It was also borne in mind that as early as 1931 Meyers (4) suspected the equine virus as responsible for three cases in man. Although the majority of cases developed among agriculturalists, some of whom came from farms where horses had suffered from encephalomyelitis, the disease was also recognized in individuals

who had lived in towns and villages and had not been in contact with diseased animals. This suggests some indirect method of transmission, as, for example, by insects.

Late in the 1938 season, arrangements were made through the Department of Public Health, to collect from encephalitis patients material which would be suitable for virus examination, but just at that time, and before any material was received, the disease suddenly disappeared. Direct examination being impossible, blood samples were collected from patients who had recovered from the disease, and tested for the presence of antibodies capable of neutralizing the equine virus. Such antibodies had been demonstrated in horses after recovery. Unfortunately, only a few sera were received, and some of them were from individuals who had suffered from encephalitis as long as three years previously. One sample collected from an infant who had a definite disturbance of the central nervous system several months before had feeble neutralizing qualities, but results obtained were sufficient to warrant a definite conclusion.

About this time Fothergill, Dingle, Farber and Connerly (5), also Webster and Wright (6), proved definitely that man is susceptible to the equine encephalomyelitis virus, by isolating the Eastern type from fatal cases in Massachusetts. Later, Howitt (7) showed that the Western type was also pathogenic to humans.

Following the 1938 epidemic in horses, an extensive vaccination program was inaugurated by the Provincial Government, advocating the use of the newly introduced chick-embryo vaccine, with the result that early in 1939 some 450,000 animals—approximately half of the horse population of the province—were protected. How far this vaccination affected the incidence of the disease is hard to state. It is true that very few cases developed that year, but while the vaccinated horses were absolutely free, cases among the unvaccinated were also uncommon. Coinciding with the reduced incidence of the equine disease, the number of reports of the human disease also fell, very few cases being recognized. On August 30, 1939, however, a brain was received from a fatal case, and at the same time a blood sample which had been secured from a patient at the onset of the disease. Both specimens came from the same district, the one in which the majority of human cases had occurred in previous years. Examination of the brain showed bacterial contamination, but, realizing from previous experience the difficulty sometimes encountered when isolating virus from original material when filtration had to be resorted to, it was deemed advisable to use some of the non-filtered tissue for inoculation purposes in the hope of enhancing the virulence of any virus that might be present. The organ was immersed in a 0.4 per cent formalin solution for a few minutes, and then washed in sterile saline. Using all possible sterile precautions the surface was removed and sections of the cerebrum and medulla secured which were ground and a 20 per cent suspension prepared in normal saline. A number of 8-day chick embryos were inoculated with this suspension, and the remainder of the suspension was passed through a Seitz filter. Most of the embryos were dead after forty-eight hours, but, as was expected, gave positive bacteriological cultures. In spite of this the embryos

were ground, suspended in saline, and passed through the Seitz filter, and the filtrate used for further transfers. Dead embryos resulted in twenty-four hours, which were sterile bacteriologically but were proved to harbor virus. After several such transfers, resulting dead embryos were used for guinea-pig inoculations, each animal receiving 0.2 cc. of a 20 per cent suspension intracerebrally. Typical encephalomyelitis symptoms developed in from forty-eight to seventy-two hours, and death after four to five days. Control guinea pigs which had been vaccinated with encephalomyelitis chick-embryo vaccine (Western type) remained well when given the same dose of virus.

NEUTRALIZATION TESTS

Brains removed from guinea pigs which died were made use of for neutralization tests. The new virus when in brain tissue was found capable of killing embryos in twenty-four hours in dilutions up to 1/10,000, when given in doses of 0.4 cc. Antiserum used had been prepared by hyper-immunizing horses with encephalomyelitis virus embryos, and was found to be highly potent. Virus dilutions were prepared so that when equal volume of antiserum was added, the first dilution was 1/25, each succeeding dilution being reduced by one-half until 1/5000 was reached. The serum-virus mixtures were placed in the icebox over night, as was virus alone in corresponding dilutions. Six embryos were inoculated with each dilution of the serum-virus mixture, and a like number with virus. Several embryos were inoculated with antiserum alone, and some with normal horse serum. All embryos receiving virus alone died within twenty-four hours. Embryos receiving antiserum with dilutions of virus weaker than 1/50 appeared quite normal. At dilutions of 1/50 the embryos were sluggish of movement and slightly congested. At 1/25, half of the embryos were dead; the others were alive but apparently diseased. Antiserum and normal horse serum embryos were alive and unharmed.

Similar neutralization tests were also carried out with guinea pigs, but owing to shortage of animals only a limited number could be done. Since it had been found that 0.2 cc. of brain tissue virus in a suspension of 1/200 would constantly kill guinea pigs in from three to five days, antiserum was mixed with virus so that the end dilution of virus was 1/50. The mixture was left over night in the cold and 0.2 cc. given intracerebrally to four guinea pigs. One control animal was given 0.2 cc. of 1/200 suspension of virus with no antiserum. It died in four days. All four animals receiving the virus antiserum mixture remained well, although they had been given four times the dose of virus which had killed a similar animal when no antiserum was used.

Protection tests were also carried out by giving guinea pigs encephalomyelitis antiserum in doses of from 1 cc. to 2 cc. followed with virus intracerebrally. The results obtained also proved that we were dealing with encephalomyelitis virus of the Western type.

Several blood samples from cases of acute encephalitis were later received, but only from one was it possible to demonstrate the presence of the enceph-

alomyelitis virus. This case developed in the west-central portion of the province and immediately encephalitis was suspected, a blood sample was secured and sent to the laboratory for examination. The usual procedure was followed and the virus isolated with little difficulty. The negative results cannot be regarded as contradicting the hypothesis of identity of the human and equine disease. The view already expressed that the virus becomes bound to the nervous tissue and so disappears from the blood would give an adequate explanation. It is also possible that the diagnosis of some of the cases may have been incorrect.

These investigations showed that the brain, though contaminated, contained encephalomyelitis virus capable of producing results in embryos and guinea pigs indistinguishable from those obtained from undoubted equine encephalomyelitis virus, and, like it, capable of neutralization by antisera prepared from the Western strain. Similar results were obtained using filtered brain extracts. Blood from two other cases treated in the same way was equally effective. These results show that brain tissue and blood from human cases contained encephalomyelitis virus, and prove that the Western virus is the pathogenic agent.

Although it has been shown that humans are susceptible to the virus of equine encephalomyelitis, and that cases have been definitely recognized in Saskatchewan, we must not conclude that this virus was wholly responsible for the Saskatchewan epidemic of 1938. Considering our findings, however, and reviewing the work of Howitt (8), after a similar outbreak in California, it is evident that physicians should constantly be on the alert for the appearance of the disease. As is now known, Howitt, after the outbreaks of acute encephalitis in California during 1937-38, which at the time were considered as due to the virus of St. Louis encephalitis, proved by neutralization tests that many cases had in reality been due to the Western type of virus of equine encephalomyelitis. Of 86 sera tested, 32 (or 37 per cent) were found to have neutralizing substances for the equine virus. It was also found that some cases which had been diagnosed as poliomyelitis were also due to the equine virus. Although it is anything but safe to conclude from neutralization tests that the disease from which these people suffered was actually due to the encephalomyelitis virus, it is significant to note that very few people who had remained well in the areas in which Howitt worked had neutralizing substances in their blood for this virus.

Even at this late date, arrangements should be made to test the blood of those who suffered from encephalitis during the last Saskatchewan outbreak, that we might get an idea as to the prevalence of the equine disease in humans. At the same time, plans should be laid whereby a rapid laboratory diagnosis of the disease can be made when suspicious cases develop, and at all times there should be an ample supply of antiserum for the treatment of developed cases. The matter of vaccination should also be given consideration, particularly now when it has been found minute doses when administered intradermally will give protection, reducing materially the chance of any untoward result which sometimes did occur when a larger dose of vaccine was necessary. It has recently been shown that when chick-embryo vaccine is given intradermally, only 1/10 as much is required as when given subcutaneously.

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Tuberculosis Control in the Indian Population of Canada*

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IN reporting the progress of any campaign, one must record progress and losses. I am happy to be able to state that during the past year considerable ground was gained and that for the present year we have not had to retreat, but have consolidated our position and even are advancing in certain sectors.

The recent census, the compilation of which has just been completed, gives the Indian population as follows:

Nova Scotia	2,172	Alberta	12,163
New Brunswick	1,922	British Columbia	24,276
Prince Edward Island	274	Northwest Territories	3,724
Quebec	14,578	Yukon Territory	1,550
Ontario	30,145		
Manitoba	14,561		
Saskatchewan	13,020	TOTAL	118,385

This is an increase of 5,875 in the past five years, without taking into account those Indians who have become enfranchised.

During the past fiscal year, a total of $380,115.00 was spent for treatment. By provinces, this was divided as follows:

Nova Scotia	$ 12,482.71	Alberta	29,434.49
New Brunswick	16,198.31	British Columbia	89,856.52
Prince Edward Island	2,017.00	Northwest Territories	20,806.32
Quebec	19,136.95	Yukon	1,281.00
Ontario	92,265.31	General	54.00
Manitoba	52,067.70		
Saskatchewan	44,515.24	TOTAL	$380,115.55

The greatest number under treatment at one time was 582, and at the end of the fiscal year, 466 were under treatment, by provinces, as follows: Nova Scotia, 13; New Brunswick, 12; Prince Edward Island, 1; Quebec, 20; Ontario, 79; Manitoba, 62; Saskatchewan, 84; Alberta, 79; British Columbia, 98; Northwest Territories, 16; Yukon, 2.

As most of you know, prior to 1937, due to lack of funds, the Indian Affairs Branch was able to accomplish very little in the way of a concerted attack upon the problem. That year the now historic meeting was held at Ottawa at the time of the Canadian Medical Association and the Canadian Tuberculosis Association meeting there, and an advisory committee was formed, which has subse-

*Presented at the fortieth annual meeting of the Canadian Tuberculosis Association, Montreal, June 1940.

quently met with the Minister and officials of the Branch on two further occasions.

As the major problem has always been primarily a financial one, I will stress that aspect of it.

During the fiscal year 1938-39, $234,225.00 was spent for treatment, with a total of 450 under treatment at the close of it.

As before stated, in 1939-40, $380,115.00 was spent, over 650 Indians receiving sanatorium treatment.

During the present year, approximately $300,000.00 will be available for treatment. In addition to this, about $100,000.00 is being spent in making more beds available.

In British Columbia, preventoria are operated in conjunction with the residential schools at Alert Bay, Mission, Cranbrook, and Coqualeetza, under the direction of a medical officer and with full-time nursing services. In general, only minimal lesions have been treated in these preventoria and open cases have been hospitalized. There is an average of about fifteen in each institution and satisfactory results have been obtained.

In two areas, Bella Coola and Hazelton, agreements have been made with the hospitals there to occupy continuously five and fifteen beds respectively and a special inclusive rate of $2.00 a day has been obtained.

The major feature of our campaign in British Columbia is being proceeded with this year. The Residential School formerly operated by the United Church at Sardis, near Chilliwack, has been acquired by the Department and is being transformed into a sanatorium. Before the end of the year a fully equipped 175-bed institution will be in operation. This will be operated by the Department and will be known as the Coqualeetza Indian Hospital.

In Alberta, surveys were again carried out in twelve or more residential schools with a total of 1,283 children examined by the Provincial clinics. There was a marked decrease in cases found. In 1938, thirty cases were discovered; in 1939, eleven. There also was a satisfactory showing in the number of "observation cases" that could now be classed as "well". Besides treatment given in sanatoria and preventoria, cases were isolated and treated in five Departmental hospitals located at the Blackfoot, Blood, Peigan, Sarcee, and Stony Indian Reserves.

Dr. A. B. Simes, Medical Superintendent of the Qu'Appelle Indian Health Unit, Saskatchewan, has a well-equipped 70-bed institution under his charge at Fort Qu'Appelle. Two full-time medical superintendents, located at Prince Albert and Battleford, have strengthened our effort in the northern part of the Province.

In Manitoba, the outstanding achievement has been the acquisition and the bringing into operation of a 50-bed institution near Selkirk, Manitoba, known as the Dynevor Indian Hospital. It is operated for the Department by the Sanatorium Board of Manitoba.

Within a month, the Department will open a 20-bed institution located on the Fisher River Reserve, one hundred miles north of Winnipeg.

In the Pine Falls Indian Hospital, eight beds are set aside for tuberculosis, and about ten patients are under treatment in the Department Hospital at Norway House. There are also patients under treatment in the St. Boniface Sanatorium, the Central Tuberculosis Clinic, and the Ninette Sanatorium.

In Ontario, five residential schools in the western part of the Province were surveyed and infectious cases removed. A number of bone and joint cases from the remote northern area have been brought under surgical treatment.

On Manitoulin Island, where there are about 2,300 Indians, surveys have shown disease to be exceedingly heavy, even for Indians. It has been decided to see what can be accomplished with an isolation unit for advanced cases. A building was purchased and renovated and is being equipped. It will be open in about a month and will provide eighteen beds. Besides caring for advanced cases in this unit, the Department will attempt to provide sanatorium treatment for cases with a more hopeful prognosis.

The largest reserve in Canada is that of the Six Nations at Brantford. The 5,000 Indians there are being kept free of infectious cases. Tuberculin testing in the schools has shown the rate of positives to compare favourably with that in surrounding white districts.

On several other reserves conditions are fairly good. The Rama Reserve at Orillia, and the large Tyendinaga Reserve of Mohawks between Belleville and Deseronto are practically free of infectious cases.

In Quebec, reserves at Oka, Caughnawaga, near Montreal, Maniwaki, Pierreville, and Lorette, near Quebec City, are fairly free from tuberculosis; that is to say, the amount of disease found by surveys is not greatly higher than that of the surrounding white areas. Conditions are known to be bad all along the northern transcontinental line, in the Lac St. John area, and around Restigouche.

In the Maritimes, problems confronting the Department are difficult. There are approximately 4,000 Indians who are scattered in small groups. New Brunswick Indians apparently have a greater incidence of disease. The high rates charged by sanatoria are a feature that does not help the progress of our campaign. In more normal times it should be the object of this Department to establish an institution somewhere in the area of Moncton or Amherst, where all cases from the Maritimes could be cared for.

In the Yukon and Northwest Territories, little progress can be reported. About twenty patients were under treatment for most of the year.

The following is the routine recommended by the Department for children in the residential schools who have been listed for observation by the Survey Clinics:

1. The children listed for observation should be kept from athletic activities and manual labour, should have extra rest and diet.

2. Rest periods should replace periods where athletics or other work is done by the other children.

3. They should be as strictly isolated as possible or practical. The section in the dormitory where they sleep and have rest periods should be separated

from the rest of the dormitory by some sort of screen or canvas. There should be rest periods, both morning and afternoon, of one or two hours. Temperature records should be kept. The diet should be supplemented and cod-liver oil should be given. The children should be separated at meals and the dishes kept separate.

4. Frequent weight records should be kept. A child that persistently runs a temperature or in whom there is loss of weight should be brought to the attention of the medical attendant.

5. Scrubbing floors, laundry work or any violent exercise should be prohibited for children in the observation list. This offsets the benefit of the rest period.

6. The children who take rest periods should not put in that time at school work afterwards as they lose the benefit of the rest periods.

Sufficient funds have not been available to treat all those properly diagnosed and recommended as requiring treatment. It is not an easy task to make a decision as to which case may be treated and which one left untreated. In selecting cases for admission to sanatoria, the following principles have been used as guides:

1. Removal of infective cases from residential schools. The Department operates, under the auspices of the churches, seventy-nine residential schools with an enrolment of over 9,000 children.

2. Cases of bone and joint tuberculosis where prompt surgical intervention offers hope of preventing permanent crippling.

3. Cases where a removal of a grossly infective case from a home promises to protect a number of other members of the family, particularly children, from the disease.

4. Certain areas are practically free from infective cases, e.g., the Six Nations Reserve at Brantford. Every effort should be made to keep it so or ground gained will soon be lost.

There are a few points that it might not be out of place for me to mention here for the special consideration of medical superintendents of sanatoria treating Indians.

1. It should be borne in mind that every patient in the sanatorium is keeping another one out. That is, have you a patient that could be discharged and replaced by another active open case? Shortening the length of stay will result in more Indians being treated.

2. The Department feels it should not have to pay rates in excess of $2.50 a day. Several first-class institutions charge us $2.00 and $2.25 a day, inclusive rate. We can operate our own institutions for less than $1.60 a day, or to add sufficient to pay 5 per cent on our investment and to amortize capital cost in twenty-five years, for $1.85. We are, therefore, averse to paying $2.75 and $3.00 a day. This considerably lessens the number of cases that we can treat.

Actual treatment I will not discuss, but as one who has spent many years on reserves and in contact with Indians, may I offer a suggestion? The Indian in an institution has the psychology of a child. He is fearful and timid. Try

to gain his friendship and his confidence. Do not alarm him by speaking within his hearing of procedures that he does not understand. I know of an Indian who was frightened and ran away home with the story that they had said "they were going to take his lungs out". A little more freedom than is allowed the average patient will, I believe, yield good dividends in the way of co-operation and contentment.

Many of the fears expressed, though, regarding the reluctance of the Indian to accept treatment, have been proved groundless. The majority of the Indians with tuberculosis are asking for treatment, and on the whole there is little more difficulty in keeping them in sanatoria than there is with whites.

In closing, I wish to express the appreciation of the Indian Affairs Branch for the co-operation and help we have received from the Canadian Tuberculosis Association, the various sanatoria, and provincial anti-tuberculosis organizations, and a word of personal appreciation for the assistance and advice I have received from many of you here.

The General Practitioner and Venereal-Disease Control in Urban Centres*

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THE Venereal Disease Prevention Act of Ontario has had and still has as its primary purpose the prevention of infection. Until recently treatment was regarded as an essential to this end. In gonorrhoea, of course, cure is synchronized with non-infectivity. In syphilis, however, one's courage to enforce treatment beyond a discernible point of infectivity has been none too securely rooted in law; one has had to depend on the patient's cooperation, or on action based on the potential clinical instability of the insufficiently treated case and the inability of the patient—and of others as well—to prove himself non-infective. A recent amendment to the legislation has put a stop to this unsatisfactory state of affairs. The amendment steps beyond the usual bounds of public health law to prevent the disastrous sequelae of venereal-disease conditions which in later years may impose a direct charge on governmental agencies. In a word, while retaining its purpose of preventing infection, the legislation now is concerned also with the adequacy of treatment. This advance is an example of the fearlessness which may reasonably characterize democratic authority in its effort to prevent some of the needless damage which may result from unwise use of the freedom of action which in legitimate pursuits we cherish so much.

The Agencies and Facilities of Control

The Physician

In the treatment of venereal disease the only legal agent is the duly qualified medical practitioner, in his capacity as private physician or as clinician. His obligation under the Act involves, however, something more than treatment alone, and one notes sometimes a divergence of interest and difference in concept of duty. For this reason, the doctor's role in a program of control will be discussed later.

The Clinic

The clinic is an agency as well as providing facilities for treatment. Economy of operation and volume of patronage confine the practicability of clinic service to the urban centre. Special-treatment clinics do not consider indigence as the requirement of admission and so may be regarded as the answer to a national problem which cannot permit the excuse, or the actuality, of inadequacy of funds for what may be prolonged or necessary treatment. The Province's

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participation in the cost of these clinics is sound in that there is no group of diseases which furnishes more recruits for those institutions which are a direct charge on the Provincial Government.

The Hospital

Admission to a public hospital for venereal disease, as for other disease, is governed by the terms of the Public Hospitals Act; the Venereal Diseases Prevention Act provides against failure on the part of hospitals to provide accommodation of this kind, except in the cases of children's hospitals and of isolation hospitals receiving communicable diseases as defined in the Public Health Act. The hospital fills another need, particularly in the urban centre with its large number of transients and of persons living in congested dwellings. For the acutely infectious person embarrassed by lack of funds and with very indifferent living accommodation, the hospital furnishes a useful form of shelter and care. Here the primary purpose of admission will be one not necessarily of hospitalization but rather of separation from the community. The medical officer of health is enabled to order such a person into hospital; he is, in fact, empowered to guarantee maintenance if the individual does not qualify under the residence clause of the Hospitals Act. The hospital as a place of detention will be discussed later.

The Health Authority

The mainspring of the community program is the medical officer of health; in him the Act vests all authority in the matter of compulsion as it relates to examination, treatment or detention. A series of statutory forms is placed at his disposal for use in circumstances which require specific order or command. Let it not be assumed that the only instrument of the health authority is mandatory power. The day of dealing with those who have venereal disease as though they were moral lepers is gone; even the openly rebellious or recalcitrant person may be amenable to tactful authority. I can assure you that the number of cases requiring mandatory action which pass through the health offices in the City of Toronto does not compare with the number which are brought to termination through courtesy and mutual understanding.

The Courts

Sessions of the courts, the police courts in the main, provide a profitable ground for the control machinery in venereal disease. Naturally the courts hear all prosecutions for breaches of the Act as committed by the public at large but this function is quite secondary. Violations of the Criminal Code involving sex offences bring to the purview of the health authority an array of anti-social people who constitute a potential reservoir of infection. The Act deals at length with powers of action with respect to those in custody. It is not intended to take undue advantage of these people, but here they are, substantially charged with offences which imply a disregard for the safety of themselves and others. A very high proportion are found, as is to be expected, infected with venereal

disease. The health authority is empowered to order examination of those in custody; he is empowered to detain in custody for treatment those who are found infected or for whom he already has on file a sufficiently recent diagnosis; such detention shall offset a dismissal of the case by the presiding magistrate and shall be effective within the pleasure of the health authority even beyond the expiration of any sentence imposed. Over-night custody, quick hearing of cases, prompt dismissals, and the options of fines are the factors which most readily defeat appropriate action. A person discharged may, of course, be subsequently dealt with as a person at large but a more acceptable procedure, in certain cases at any rate, if clearly charged, is a remand in custody without bail. This may imply deferment also of the taking of evidence, and for this reason the ultra-just may dislike the procedure, but experience has shown this course to be an expedient one in dealing with people who neither give quarter nor thanks for any given them.

Places of Detention

All local and county jails and provincial prisons and reformatories are legal places of detention for the treatment of venereal disease. Hospitals lack the power of forceful restraint and consequently a simple order to the person in charge does not necessarily prevent the patient's leaving. One has to use a more complex procedure. The order is delivered to the head of the hospital, the patient is shown the order and warned of the consequence of disobedience, namely, apprehension by warrant.

PROHIBITIONS AND SAFEGUARDS

Utterances and Disclosures

The Act prohibits utterances, verbal or otherwise, true or false, on the part of anyone, which would convey or imply that another has in any way been dealt with under the provisions of the Act. Exceptions are disclosures made in good faith to a medical officer of health, and those which in the same spirit pass between medical officer of health and physician, or between physicians relative to cases of mutual interest.

Administrative Secrecy

Everyone employed in the administration of the Act is enjoined, under pain of severe penalty, to strict secrecy. Physicians are assured that confidential information may be safely lodged with the health authority and that the latter will guard it against misuse or illegal communication.

Hearings in Camera

All court proceedings against uncooperative infected individuals are conducted in camera and no report of the proceedings may be published in any newspaper. The physician need have little compunction, therefore, when he weighs the necessity of reporting to the medical officer of health an individual who in turn may have to be prosecuted. Furthermore, the physician is assured

that prosecution does not promptly follow reporting and that rarely is a person taken into court who has shown any semblance of compliance with the law.

Illicit Practice

The Act precludes the practice of charlatans and quacks, as also any act of publication or solicitation by those who may disclaim membership in this category. The Act further forbids attendance on patients by anyone except a physician, and the prescribing or offering for sale of remedial agents by anyone other than a physician or a registered pharmacist dispensing a physician's prescription. Tale-bearing is not necessarily suggested to physicians but, if any comfort is to be derived from a substitution of words, it is strongly submitted that there should be no hesitancy on the part of anyone to assist in a ruthless stamping out of any practice of this sort.

THE RELATIONSHIP BETWEEN HEALTH AUTHORITY AND PRIVATE PHYSICIAN

Administratively, there may appear to be little in common between these two parties, the health authority being fundamentally the administrator, the physician the therapist. When we consider seriously that a large part of the prevailing venereal disease is treated and brought to a successful termination without any participation by officialdom, we may ask ourselves how much of this is a purely unilateral accomplishment. When it is recalled that every case has a source, some a contact or contacts, that in very many instances the source or contact will lie outside the immediate circle to which the physician has approach, we may wonder how many foci of infection are actually lost to us until such time as they may come to notice through other, perhaps less restrained, channels. We take it for granted that many physicians realize all this, we appreciate the difficulties in the way, we know that in private practice it is fairly common procedure for the affected one to constrain his consort or paramour to seek examination, that the highly promiscuous element will make every endeavour to spare itself the trouble of compiling a roster of contacts, and in fact will resort to clinics more often than to physicians; we know all this, but it does not explain why such information comes to the health authority as an exception rather than the rule. The health authority alone is empowered to take the necessary enforcing action and it is suspected that physicians are not doing all that they could in this direction. Some of the same criticism might be offered respecting abandonment of treatment except that in this connection we do find a more liberal requisitioning of the authority of the medical officer of health. Nevertheless there is need for improvement here as well.

THE PRIVATE PHYSICIAN

Every physician should familiarize himself with the Act, particularly those sections which concern circumstances in which he may become involved. It is not too much to expect, too, that he sense the effect of certain technical inadequacies on his part which at times occasion discomfiture to his patients in their

attempt to satisfy demands made upon them. For example, it is obvious that to hand a patient a serological or laboratory report is not the equivalent of giving a certificate. Similarly a negative report on one of the diseases is not evidence that the individual has *no* venereal disease. To state that there is no evidence of communicable disease or that a patient is in good health is too general a statement. To have a patient admit that standard methods of examination were not used is discrediting to the physician. To promise to mail a report and forget to do so is serious to the patient. To report a case for follow-up by the medical officer of health with a statement of only the serological findings when a diagnosis could have been offered, requires the health authority to go through more steps than necessary. To allow a secretary to sign a communication "Doctor ..... per ....." is technically wrong. These are a few of the common errors and omissions which cause unnecessary worry and work for all concerned.

Naturally no physician need receive patients with venereal disease for diagnosis or treatment unless it is his wish to do so. Once he receives a case, however, he assumes a large measure of responsibility. A recent amendment to the Act requires that a diagnosis, even if the case is rejected or referred for treatment elsewhere, must be followed by notification.

In the matter of treatment the physician is morally responsible to provide the best at his command. In the Regulations is to be found a section denoting the methods and remedies which are considered lawful and proper for the treatment, alleviation and cure of venereal diseases.

If the physician voluntarily relinquishes attendance on a given case, at any time after diagnosis, he should communicate the fact to the medical officer of health so that the latter may take steps to satisfy himself that the patient is receiving treatment. An equally frequent occurrence demanding similar procedure is the occasion of abandonment of treatment or intractable irregularity of treatment on the part of the patient. By the Regulations a patient is specifically limited in such action "during the course of the disease" and "until the degree of treatment secured is considered adequate by the attending physician and the Department," "Department" here referring to the Department of Health of Ontario, which thus reserves a right of opinion and decision in the matter of adequacy of treatment. In either of the two circumstances cited a communication in detail shall be forwarded to the medical officer of health in a sealed envelope and shall be signed in full by the physician.

A weakness more common to the indifferent, irregular or discouraged type of patient is the control of conduct while infective. This will apply in lesser degree to other types. The medical profession has an important problem on its hands. Because these people cannot be policed, words should not be minced. The length of time "to be good", marital relationships, and the bearing of costs on continuity of treatment add to the trials of the individual. So many other angles for adjustment present themselves that those with experience agree that the maximum of success comes substantially from an early assessment and very frank discussion between the doctor and his patient. It is a case of "cards on the table".

The question of sources and contacts merits further comment. Credibility of information may seem a stumbling block. A statement of contact will produce less doubt than an allegation of source. If the information concerning source appears credible to a physician who is capable of weighing the various factors, it is invited by the health authority. The physician in this process may be relieved to recall that the health authority does not take any statutory action quickly, and will, if it can, contact the alleged source. Furthermore, by way of initial approach the administrator has found it helpful in many cases, when discussing the allegation with a person, to introduce the subject along lines of contact in intercourse rather than to accuse the individual bluntly of being a source. If the physician can get a signed declaration from his patient, so much the better; in its absence he is asked to report, over his own signature, the credible information, with as much detail as possible in support of the allegation.

Notification, by serial number as heretofore, now goes to the Provincial authority. The Province has also inaugurated a practice of follow-up of notifications by requiring from the notifying physician progress reports from time to time. This is a useful procedure in any municipality but more particularly in communities not fully organized for this work. In places in which organization has been satisfactory a few questions may arise, e.g.: To what extent will these return reports disturb the function of the local authority? To what extent will anticipation of request for progress reports delay reporting of abandonment or irregularity of treatment? To whom will physicians send any interim communications? Have we two masters to serve? These are normal reactions. Let us recall, however, that there always have been and always will be two masters in public health matters; one now becomes somewhat more paternalistic. There are no grounds for criticism, as united efforts are needed to meet the problems presented by these diseases. All will be well if the physician of the well-organized urban centre will continue to communicate with the local authority in the circumstances cited. The change of destination of notification cards offers no particular disturbance to local administration. The progress reports to the Province should be regarded as something supplementary. If in addition to notifying the local authority of circumstances demanding official action the physician cares to communicate also with the provincial authority, no one will object. The main thing is to do things and to do them promptly.

Plague Surveys in Western Canada*

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PLAGUE surveys initiated in Alberta and British Columbia in 1938 were extended during 1939 and 1940. The investigations are being carried on jointly by the Dominion Department of Pensions and National Health and the Health Departments of the two Provinces. In furtherance of this, and of other studies reported separately, the Dominion Department in 1939 established a laboratory at Kamloops, B.C. Observations made during 1938 have been reported (1). The present report reviews the findings during 1939 and the earlier part of 1940. It includes both sylvatic plague and urban rat-flea surveys.

Rat-Flea Surveys

In the fall of 1939 a rat and rat-flea survey was made in the seaports of Vancouver and New Westminster. Rats were captured along the waterfront areas and at inland garbage dumps. They were immediately sealed in paper bags to ensure the capture of all ectoparasites. The fleas were collected from the animals into vials of neutral 0.9 per cent saline. Each rodent was then autopsied and from any showing suspicious lesions tissue samples were sent to the laboratory in iced metal containers. Flea species in all lots were determined in order to record the "cheopis index." Fortunately the species of fleas normally infesting rats are sufficiently separated taxonomically to be determined without the necessity of clearing and mounting, which would render samples valueless for subsequent inoculation tests. The fleas were then washed with saline to remove debris and ground in a mortar, and a saline suspension was injected into guinea pigs. Tissue specimens were macerated and a saline suspension injected into guinea pigs. The animals were observed for three weeks, after which time they were released if no signs of infection were apparent. Table I lists the collections and shows the flea indices.

TABLE I

RAT AND RAT-FLEA COLLECTIONS

Locality	No. of Rats	No. of Fleas	Flea Index	X. Cheopis	Cheopis Index
Vancouver Waterfront.....	316	615	1.95	2	....
Vancouver Inland No. 1....	115	7	0	....	....
Vancouver Inland No. 2....	725	1,403	1.94	1,021	1.41
New Westminster.....	66	52	0.8	16	0.24

All rats collected at inland locations in Vancouver were *Rattus norvegicus*

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Erxlebin (Norway rat) and this species comprised 99.6 per cent of all collections. Two black rats (*Rattus rattus rattus*) and three Alexandrine rats (*Rattus rattus alexandrinus*) were captured in the waterfront area. Since there is no evidence of the establishment of colonies of these species, it is possible that they represent occasional rats newly introduced from ships. If so, they indicate a hazard towards the introduction of plague into this port which at present appears to be free of infection.

The recorded cheopis index in one inland collecting point in Vancouver is above Wu's (2) "critical cheopis index of one." The recorded figure is probably below the actual index, as a portion of the rats were trapped and some of the fleas may have been lost before the animals were collected from the traps. In one group of 26 rats which were shot and from which all fleas were recovered immediately the cheopis index was 3.42 and a second group of 30 rats gave a cheopis index of 2.17. This is in marked contrast to the waterfront area, where *X. cheopis* was rarely encountered.

Sylvatic Plague

Sylvatic plague was first demonstrated on the North American continent in 1909, infecting ground squirrels in the state of California. Subsequent extensive field investigations have discovered wild rodent plague in ten of the western states, including Washington, Idaho and Montana, which border on the provinces of Alberta and British Columbia. Twenty-nine species of rodents have been incriminated (3), of which fourteen species of ground squirrels form the most important reservoir of infection. Plague has also been demonstrated in a Washington cottontail rabbit (4).

Following a general survey in 1938, particular attention was given to the southern portion of each province in view of the known sylvatic plague foci in the border states. Ground squirrels with their ectoparasites formed the bulk of specimens collected, the Columbian ground squirrel (*Citellus columbianus columbianus*) in British Columbia and the southern foothills of Alberta and Richardson's ground squirrel (*Citellus richardsonii richardsonii*) in the prairie areas of Alberta. Table II lists the specimens examined.

TABLE II

SPECIMENS EXAMINED FOR PLAGUE INFECTION

	Type of Rodent	No. of Rodents	No. of Fleas	Flea Index
Alta.	R.G.S.	2,025	4,437	2.04
	C.G.S.	286	754	2.99
	Misc.	144	97	....
		2,455	5,288	
B.C.	C.G.S.	3,943	10,024	2.54
	Misc.	6	42	....
		3,949	10,066	
Totals		6,404	15,354	

R.G.S.—Richardson's ground squirrel.
C.G.S.—Columbian ground squirrel.

Collections were made and laboratory examinations carried out in a manner similar to that described for the rat surveys. Flea specimens were examined by an entomologist and small representative samples were cleared and mounted. Various species of fleas infesting ground squirrels may be so closely related taxonomically that cleared mounts are necessary for accurate species determination.

No evidence of plague was found in 3,949 rodents and 10,066 fleas collected in British Columbia, nor has any history been obtained of suggestive rodent epizootics.

In August, 1939, *Pasteurella pestis* was demonstrated in tissue from a Richardson's ground squirrel found dead in Eastern Alberta, 180 miles north of the international boundry. A number of other carcasses were observed in the fields but were so decomposed that they were not forwarded to the laboratory. Farmers reported that ground squirrels had died in large numbers in this area during the previous year. Two fleas recovered from the dead ground squirrel proved to be infected with *P. pestis*. These fleas, in saline mount, were identified as of the genus *Opisocrostus* and the species tentatively identified as *Opisocrostus labis* (*Jordan and Rothschild*). From other ground squirrels collected in the vicinity the following species were definitely identified in cleared mounts: *Hystrichopsylla dippiei* (*Roths*); *Neopsylla inopina* (*Roths*); *Rectofrontia fraterna* (*Baker*); **Oropsylla rupestris* (*Jordan*); **Opisocrostis tuberculatus* (*Baker*); **Opisocrostis labis* (*Jordan and Rothschild*). Three of these, marked with an asterisk, were listed by Eskey (4) as potential plague vectors.

The positive findings in 1939 occurred late in the season of squirrel activity and since the animals were then going into hibernation it was not possible to procure further specimens. The following spring the survey in Alberta concentrated on delimitation of the area over which rodent infection had extended, though investigations in other parts of the province were also continued. Five out of 80 flea pools and one out of 60 tissue samples have been positive for plague. These new findings place the infection over an area of at least 144 square miles extending into 4 townships.

Preventive measures taken following the finding of rodent plague have included systematic poisoning of ground squirrels over a considerable area radiating from the positive focus, education of the residents to the dangers of handling ground squirrels, and removal of the ground squirrel bounty. This last measure may at first sight seem to detract from the program of squirrel extermination. However, the custom had been to submit the tails of the animals as evidence for collection of the bounty, the tail being plucked from the carcass. This exposed the collectors, usually school children, to open tissue of the rodents and might readily result in infection if plague-positive animals were encountered.

Before the discovery of sylvatic plague in this area a local farmer had died under conditions which in retrospect are suspicious of plague infection. This man, C. H., age 34, kept a number of mink which he fed on ground squirrels. The mink were healthy until he started feeding ground squirrels caught in the location now known to harbour rodent plague. Several of the

animals then became ill and died. He pelted the dead mink and in doing so scratched his knuckle with the knife. He noted that the mink had "spots" on the liver and spleen. Forty-eight hours later he had a sudden onset of weakness and general malaise. His temperature rapidly rose to 105° F. accompanied by nausea, soreness of the muscles of the back and chest, and a left axillary adenitis. His temperature remained high and toxaemia became marked. A short time before death, which occurred early on the fourth day, he developed a slight cough. Blood cultures taken during his illness were reported as badly contaminated and no bacteriological diagnosis was given. The diagnosis at autopsy was acute septicaemia.

Subsequent to the death of C. H. another farmer started to feed mink on ground squirrels collected in this same area and several animals became ill and died. He changed his source of ground squirrels and had no further trouble.

The chain of evidence leaves little doubt that C. H. died from an infection of which ground squirrels were the original source. An epizootic in ground squirrels in this area had been reported and was substantiated by finding many carcasses of dead rodents. Plague infection was demonstrated both in ground squirrels and ground squirrel fleas. The course of C. H.'s illness, though it might be duplicated by other acute septicaemias, is compatible with septicaemic plague. It is suggested therefore that this was probably a case of plague. That none of the attendants became infected would be attributed to the rapid course of infection. Plague bacilli are either absent or few in numbers in the sputum in the very early stages of lung involvement and in this case there was only a slight cough for a short period preceding death.

DISCUSSION

Though no definitely proved cases of human plague have occurred, the demonstration of infection in wild rodents is a matter of concern because of the potential hazards involved. A single unrecognized human case, should it become pneumonic, could readily initiate a sharp and highly fatal epidemic. This was illustrated in the Oakland outbreak of 1919 and the Los Angeles epidemic in 1925 (5). Further, should infected ground squirrels come in contact with rats in an urban area, the disease might, if conditions were suitable, become epidemic in the classical form.

At present we do not know how the infection in wild rodents was introduced into Western Canada or to what extent it has or will in the future spread. Since wild rodent plague may remain apparently quiescent in any one area for several years and then reappear (6), negative findings in any one season do not preclude the presence of plague infection. Extensive and continued examinations of the wild rodent population are therefore necessary if the infection is to be controlled.

SUMMARY

1. During a rat and rat-flea survey of two west coast seaports 1222 rats

with 2077 fleas were examined and no evidence of plague was adduced. The cheopis index varied markedly in different areas within the same city. The highest cheopis index was 3.42. Ninety-nine point six per cent of the rats were *Rattus norvegicus Erxlebin*.

2. *P. pestis* was demonstrated in Richardson's ground squirrels and ground squirrel fleas from south-eastern Alberta, 180 miles north of the international boundary. The infection was present over at least four townships embracing an area of 144 square miles.

3. Sylvatic plague was not found in British Columbia.

4. A case history of suspected human plague is reviewed.

ACNOWLEDGMENT

We wish to acknowledge our indebtedness to Mr. G. P. Holland, assistant in the Division of Entomology, Science Service, Department of Agriculture, Kamloops, B.C., for the determination of flea species.

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A Study of Methods for the Detection of the Presence of Coliform Organisms in Water*

Report of the Committee on Bacteriological Examination of Water and Sewage
Laboratory Section, Canadian Public Health Association

N. J. HOWARD, A. G. LOCHHEAD
AND M. H. McCRADY, *Chairman*

AMONG the various means employed by the laboratory to detect pollution of a water supply, the determination of the number of coliform organisms contained in a given quantity of the water has long been recognized as the most useful and informative. The method to be used for enumerating these organisms, however, is still a subject of lively controversy, although a vast amount of research has been devoted to the question during the past fifty years. The reason for this unsatisfactory state of affairs is two-fold: first, the technical difficulties in the way of detection of the presence of coliform organisms; second, an increasingly urgent demand for simpler methods of coliform detection than those in current use, to the end that, by means of more frequent laboratory examination, a control of the sanitary quality of water supplies closer than that now obtainable may economically be secured.

This demand for simpler methods of water examination led the Committee on Standard Methods of the American Public Health Association to institute, some years ago, a comprehensive investigation of a number of procedures that had been proposed, from time to time, to replace the standard method. Ruchhoft and Norton (1) reported the results of a preliminary study, by a large number of laboratories, of the comparative productivity of several media when inoculated with various strains of coliform organisms and lactose fermenting spore-formers.

Following the suggestions indicated in this report, the Committee next attempted a study of the comparative utility of fuchsin lactose broth, brilliant green bile broth, crystal violet broth and formate ricinoleate broth as media for confirmation of lactose broth presumptives, and of standard lactose broth and fuchsin lactose broth as primary media. A group of 21 laboratories, situated in the United States and Canada, collaborated in this study, the results of which were reported by McCrady (2). A total of 1,213 samples of water, from which lactose broth presumptives numbering 21,168 were obtained, was examined, employing 5 different methods of confirmation: the completed test of *Standard Methods of Water Analysis*, and 4 liquid media methods using the media mentioned above. Fuchsin broth was also employed as a *primary* medium for the examination of 890 of the samples.

*Presented at the eighth annual Christmas meeting of the Laboratory Section, Canadian Public Health Association, Toronto, December 1939.

The following excerpt from the summary of the report indicates the general conclusions derived from this study.

"The results reported by the collaborating laboratories indicated the brilliant green bile confirmatory method to be the most generally satisfactory of the selective procedures. The results also indicated that the brilliant green bile method compared very favourably with the usual Standard Methods 'completed test' and, for the examination of most waters, might advantageously replace it. The results obtained from finished waters suggest the use, with such waters, of the alternative 'completed test' procedure of Standard Methods: the employment of the brilliant green bile confirmatory method, followed by attempted isolation of coliform organisms from presumptives of this medium, instead of the 'completed test' of lactose broth presumptives, in order to eliminate much of the labour involved in the latter procedure.

"The results obtained from the use of fuchsin broth, whether as a direct presumptive medium or as a primary medium replacing lactose broth, were not so generally satisfactory as those secured through the use of lactose broth followed by the brilliant green bile confirmed test or completed test."

Another study (3) made by a group of American and Canadian laboratories in 1938-39 showed MacConkey broth (neutral red bile salt lactose broth), prepared with English bile salt, to yield results very similar to those secured from the use of fuchsin broth. Despite the success experienced in the employment of the MacConkey presumptive test (without confirmation) for the examination of British waters, this test does not appear to be generally applicable to the examination of waters on this continent; similar unfavourable experience with this medium has been reported from Australia (4).

EXPERIMENTAL

The favourable results obtained through the use of brilliant green bile as a confirmatory medium led the Committee on Bacteriological Examination of Water and Sewage, of the Canadian Public Health Association, to inquire further into the practicability of employing it for the examination of Canadian waters. To this end, the collaboration of the following five laboratories was secured:

Edmonton, Alberta, Provincial Laboratory (A. C. Rankin, Director).

Hamilton, Ont., Filtration Plant Laboratory (D. H. Matheson, Chemist and Bacteriologist).

Montreal, Que., Provincial Ministry of Health (J. Archambault, Chief Chemist).

Ottawa, Ont., Central Experimental Farm, Dominion Department of Agriculture (A. G. Lochhead, Dominion Agricultural Bacteriologist).

Toronto, Ont., City Filtration Plant (N. J. Howard, Director, and R. E. Thompson, Chemist).

The following procedure was employed for this study:

1. Five portions of 1 cc. and five of 10 cc. of sample were planted in standard lactose broth and incubated at 37°C. for 48 hours.

2. If, and when, gas in any amount appeared, the lactose broth culture was shaken and a loopful transferred to a tube of brilliant green bile (2 per cent);

and the lactose broth presumptive was also confirmed completely in the usual manner (using eosin methylene blue plate, agar slant, microscopic examination of Gram-stained preparation of agar culture, and secondary lactose).

3. The brilliant green bile tube was incubated at 37°C. for 48 hours, and as soon as gas appeared, this indication was completely confirmed as in (2).

TABLE I

RESULTS OF COMPARISON OF THREE METHODS FOR DETECTION OF PRESENCE OF COLIFORM ORGANISMS

Laboratory	Waters	Samples with presumptives	Lactose broth presumptives	Coliform isolations from lactose broth	Gas in confirmatory brilliant green bile	Coliform isolations from brilliant green bile
		No.	No.	No.	No.	No.
Hamilton	Raw.....	27	136	116 (4)**	131	115 (5)**
	Applied.....	6	6	1	1	1
	Filtered.....	1	1	0	0	0
	Finished*....	58	62	0	0	0
		92	205	117 (4)	132	116 (5)
Montreal	Brooks.....	4	38	36 (1)	37	37
	Lakes.....	6	40	27 (7)	30	30
	Springs.....	23	180	143 (19)	162	154 (3)
	Wells.....	24	137	101 (5)	108	96 (3)
	Filtered.....	2	10	7 (1)	8	6 (1)
	Filt-treated..	3	13	10	10	10
	Treated.....	5	24	3 (1)	4	2 (1)
		67	442	327 (34)	359	335 (8)
Ottawa	Wells.....	29	194	148 (11)	171	153 (5)
	Springs.....	4	33	16 (6)	28	21 (1)
	Others.....	3	16	8 (3)	11	11
		36	243	172 (20)	210	185 (6)
Toronto	Raw.....	11	67	48 (3)	61	50 (1)
	Filtered.....	12	55	41 (2)	53	42 (1)
	Finished*. ..	7	15	3 (3)	13	6
		30	137	92 (8)	127	98 (2)
Total.....		225	1027	708 (66)	828	734 (21)

*Hamilton's finished water figures represent the results of examination of two portions of 25 cc. each of about 600 samples.

**The figures in parentheses represent the number of tubes from which coliforms were not isolated, but from the corresponding lactose broth (or bile) tubes of which coliforms were isolated.

The results reported by four of the collaborating laboratories are shown in table I (those from the fifth laboratory, reported in less detail, will be considered later). Only those samples that produced gas in lactose broth are included; several hundred other samples which gave entirely negative results are omitted.

It will be observed, in table I, that Hamilton's 92 samples produced gas in 205 lactose broth tubes; from 117 of these coliform organisms were isolated directly, but were also isolated from brilliant green bile after transfer

from 4 other lactose broth presumptives; thus a total of 117+4 or 121 lactose broth tubes were shown to contain the organisms sought. Upon transfer of lactose broth presumptives to brilliant green bile, gas was produced in 132 tubes, from 116 of which coliforms were isolated; but in five instances although coliforms were not isolated from brilliant green bile gas positives, coliforms were isolated directly from the corresponding lactose broth tubes; very probably, therefore, at least 121 of the 132 brilliant green bile gas positives contained coliform organisms.

Similarly, 361 (327+34) of Montreal's lactose broth presumptives were shown to contain coliform organisms; gas was produced in 359 of the confirmatory brilliant green bile tubes, from 335 of which the organisms were isolated, whereas only 327 of the lactose broth tubes were confirmed directly.

A total of 192 (172+20) of Ottawa's lactose broth presumptives contained coliforms; 210 of the brilliant green bile transfers were gas positive, and coliforms were isolated from 185 of these. Isolations were secured from only 172 lactose broth presumptives by direct examination.

Of Toronto's presumptives, 100 were shown to contain coliforms; gas was produced in 127 brilliant green bile transfers, from 98 of which coliforms were isolated; 92 of the lactose broth presumptives were confirmed directly.

Table II shows the more important data of table I expressed in terms of

TABLE II

RESULTS OF COMPARISON OF THREE COLIFORM METHODS IN PERCENTAGE OF SAMPLE PORTIONS SHOWN, BY TWO ISOLATION PROCEDURES, TO CONTAIN COLIFORM ORGANISMS

Laboratory	1 Lactose broth presumptives shown by the use of two methods to contain coliforms	2 Gas in brilliant green bile transfers	3 Coliforms isolated directly from lactose broth	4 Coliforms isolated from brilliant green bile gas positive transfers
	No.	Per cent of column 1	Per cent of column 1	Per cent of column 1
Hamilton	121	109	97	96
Montreal	361	99	91	93
Ottawa	192	109	90	96
Toronto	100	127	92	98
Average		111	93	96

percentages of the sample portions shown to contain coliform organisms by isolation either directly from lactose broth presumptives or indirectly from brilliant green bile after transfer from these presumptives. It is obvious, from columns 3 and 4 of this table, that coliforms were isolated more frequently from confirmatory brilliant green bile than directly from lactose broth by three of the laboratories, and practically as frequently from one as from the other medium by the fourth (Hamilton) laboratory. In other words, complete confirmation of brilliant green bile transfers yielded more isolations of coliform organisms than did direct complete confirmation of the lactose broth presumptives.

As shown in column 2 of the table, the production of gas in confirmatory brilliant green bile was a fair indication of the presence of coliforms except in the Toronto laboratory where the proportion of false positives was apparently 27 per cent. The brilliant green bile gas positives exceeded by an average of 11 per cent the number of presumptives shown by two methods of complete confirmation to contain coliform organisms.

It is to be noted, however, that the use, in the present study, of the additional confirmatory method of isolation from brilliant green bile after transfer from lactose broth presumptives indicated (taking the figures of table II) that for every 93 presumptives found, upon direct examination, to contain coliforms, 7 more were found, upon examination of brilliant green transfers, to contain them; in other words, the use of the usual procedure was shown to be in error by 7 per cent. In the previous study in which 21 laboratories collaborated, the use of five methods of complete confirmation indicated this error to be 14 per cent; and very probably a more intensive search would have shown it to be even greater. Assuming a similar error of 14 per cent in the results of the present study, the figure 93 of column 3, table II, representing presumptives containing coliforms, becomes when corrected, 106. If the loss of coliforms due to our faulty confirmation method were proportionally the same in this as in the previous study, 106, instead of 93, may be taken to represent presumptives containing coliforms; and this figure approaches closely that of 111 representing tubes of brilliant green bile in which gas was produced after transfer from lactose broth presumptives.

It appears, therefore, that the production of gas in brilliant green bile, following transfer from lactose broth presumptives, constituted a reasonably accurate indication of the presence of coliforms. Although an average of 11 per cent of false positives was suggested by the results of a very limited effort to isolate coliforms, there is little doubt that a more intensive effort would have shown the proportion of false positives to be lower.

A comparison of the figures of columns 3 and 4 indicates again the advantage of complete confirmation from confirmatory brilliant green bile instead of from primary lactose broth. The advantage is particularly marked in the results from the Ottawa and Toronto laboratories. It must be remembered, in this connection, that the number of confirmatory brilliant green bile tubes which had to be completely confirmed was, in the aggregate, only 81 per cent of the lactose presumptives, the proportions reported by the individual laboratories varying from 64 to 93 per cent.

RESULTS REPORTED BY THE ALBERTA LABORATORY

The results contributed by the Alberta laboratory, of a comparison of the completed test and brilliant green bile secondary for confirmation of lactose broth presumptives, are shown in table III.

A total of 230 samples yielded lactose broth presumptives. In only five instances did gas fail to appear in brilliant green bile inoculated from presump-

tives which were shown, by direct complete confirmation of the latter, to contain coliform organisms.

TABLE III

COMPARISON OF COMPLETED TEST AND BRILLIANT GREEN BILE SECONDARY FOR CONFIRMATION OF LACTOSE BROTH PRESUMPTIVES

ALBERTA LABORATORIES

Samples	Completed Test Gas in B.G. Bile	+ +	− −	+ −	− +	Total
Rivers		34	1	1	1	37
Creeks		5				5
Mountain streams		18		2		20
Lakes		10				10
Pools, tanks, etc.		4	1			5
Spring		3	6			9
Wells		115	20	2	7	144
		189	28	5	8	230

On the other hand, in eight instances, gas appeared in the brilliant green bile transfer when complete confirmation of the corresponding lactose broth presumptive gave a negative result.

The two methods yielded identical results when employed for the confirmation of the lactose broth presumptives from 217, or 95 per cent of the total number of samples. It is obvious that the error, due to the use of the more rapid brilliant green bile method of confirmation, is not excessive; and, since it is a common experience that the usual routine complete confirmation occasionally fails to detect the presence of coliform organisms when they are actually present, the error due to the use of brilliant green bile may be even less than that indicated by the reported results.

DISCUSSION

Although it must be admitted that the water bacteriologist who employs those methods of detection of coliform organisms which permit isolation and identification of the organisms sought, derives a measure of satisfaction from the conclusive character of the results thus secured, it is to be remembered that the usual isolation procedure is time-consuming, costly, and yields results which may be in error by as much as 30 per cent or more, because of the difficulty of culturing the organisms and identifying their colonies on the confirmatory agar plate.

Not only is the routine "completed test" far from being an accurate procedure. Its use may enable two technicians, working with the same primary presumptives, to obtain quite different results; furthermore, because of the labour involved in performing this test, the technician frequently is obliged to limit his confirmation to a choice of one or two of several presumptives obtained from a sample; and since it may be a matter of chance whether or not he chooses presumptives that contain coliforms, this speculative practice subjects the final results to another cause of error.

Confirmation by means of brilliant green bile, involving simply the transfer

of a loopful of the lactose broth presumptive culture to a tube of this medium and incubation of the latter for 24-48 hours, offers a convenient and usually satisfactory alternative method. It requires so little manipulation that every presumptive from every sample may be examined, and the error, if any, in the results obtained, is usually on the safe side: too many coliforms will be indicated rather than the too few revealed by the usual completed test. Moreover, two technicians examining the same presumptives by this simpler method, should secure, practically always, identical results, for its use involves no exercise of judgment or speculation on their part; in fact, very little technical training is required for such work.

If, however, it becomes necessary to perform the completed test, the results of operating upon the brilliant green bile confirmatory gas-positives appear to be, as a rule, quite as satisfactory as those secured by complete confirmation of the original primary lactose broth presumptives.

Another advantage to be derived from the use of the liquid medium method of confirmation is the reduction of the time required for satisfactory, practical confirmation: within 24 hours, or at most within 48 hours, there is available an estimate, usually reasonably accurate, of the number of lactose broth presumptives which contain coliforms. Upon plating directly from lactose broth presumptives, however, colonies of organisms are frequently encountered which require an additional period of 24 hours or more before they can be identified.

The great majority of the water bacteriologists of this continent demand at present a coliform test that conforms to the following requirements:

(a) It must detect as many as possible of the coliform organisms present in the sample examined.

(b) It must require, for its performance, a minimum of time and material.

(c) The results secured must be reasonably accurate.

The use of primary lactose broth followed by the "confirmed test", employing a transfer to brilliant green bile, appears to constitute, of the tests available at the moment, that which most nearly meets these requirements. If, in special cases, isolation and identification of the coliform organisms present in a sample is essential, the "completed test" of brilliant green bile gas positives yields results that are quite as dependable as those secured by isolation directly from primary lactose broth presumptives, with often a considerable economy of labour and materials. In one study of this method of performing the "completed test", for example, the Minnesota State Laboratory examined a large number of samples of Minneapolis tap water, testing 10 portions of 100 cc. of each sample; 68 samples yielded lactose broth presumptives. From 8 of the 402 presumptives coliform organisms were isolated after an exhaustive search; the usual "completed test" of the 402 presumptives yielded 6 positives; and the brilliant green bile confirmatory method, 12 gas positives, from 7 of which coliforms were isolated. In other words, as many coliforms were isolated upon examination of the 12 brilliant green bile gas positives as were recovered by complete testing of the 402 lactose broth presumptives.

CONCLUSIONS

The results of a study, by a group of Canadian laboratories, of the brilliant green bile method of confirming lactose broth presumptives obtained in the course of bacteriological examination of a number of Canadian waters, indicate this rapid confirmatory method to be quite as satisfactory, for detection of coliform organisms in such waters, as the more involved "completed test".

The application of the "completed test" to brilliant green bile gas positives yielded a number of coliform isolations that compares very favourably with that obtained by applying the "completed test" directly to the original lactose broth presumptives.

The results confirm, in these respects, those previously reported by a large group of American and Canadian laboratories, and suggest that the brilliant green bile confirmatory procedures may satisfactorily be employed in the bacteriological examination of the great majority of Canadian, as well as American waters.

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THE PUBLIC HEALTH PROBLEM OF EQUINE ENCEPHALOMYELITIS

TWO papers dealing with the subject of equine encephalomyelitis appear in the current issue. These not only emphasize work previously published but indicate that the topic is pertinent to Canada. For the benefit of readers unfamiliar with equine encephalomyelitis, it may be said that two types of virus, eastern and western, are capable of causing the disease; these have no serological relationship.

It is interesting to note that the mortality in the Massachusetts outbreak, caused by the eastern type, was approximately 70 per cent, whereas the mortality in the cases now reported in this Journal, and which were caused by the western type, was approximately 15 per cent.

Consideration of the epidemiology of the disease is bound to bring to light many interesting factors which relate not only to encephalomyelitis but also to other neurotrophic virus diseases. The seasonal incidence is not easily explained since concrete evidence is not forthcoming to indicate that the virus is transferred only by insects. This seasonal incidence is also an interesting phase of poliomyelitis.

Authorities are generally agreed that the virus does not persist long in known susceptible animals. This raises the question: Where, during the many months the disease is not endemic, is the virus harboured? With the discovery of the reservoir of the virus during this latent period, light will be thrown on the epidemiology of encephalomyelitis and, perhaps, also on other seasonal virus diseases.

The occurrence of encephalomyelitis in man, at a time and in a region where the disease is prevalent in horses, might tend to support the dogmatic theory that man is infected from horses. For the present it would seem wise to avoid this interpretation since it may be that man is infected from the same source or sources as the horse.

A solid immunity against this disease can be conferred by the injection of virus propagated on developing chick embryo and subsequently inactivated with formalin. Now that a highly satisfactory immunizing agent is available, it is not so important whether the epidemiology of the disease is fully worked out in the near future or is longer delayed.

A considerable number of persons in Canada, especially those working with the disease, have been immunized by vaccination, but encephalomyelitis of man is not extensive enough in Canada to warrant wholesale use of the vaccine. It should be generally known, however, that evidence, submitted in the two papers contained in this issue, indicates that during a widespread epizootic in horses a limited number of persons in the same area may become infected with the virus; also, that a satisfactory protective agent is available.

The study of encephalomyelitis and the elucidation of many interesting factors concerned with its epidemiology are almost certain to be of value in a wider field. Many factors relating to neurotrophic virus diseases are obscure and light thrown upon encephalomyelitis will lead to a better understanding of other diseases caused by comparative etiological agents.

Chas. A. Mitchell

TUBERCULOSIS IN THE INDIAN POPULATION

ALTHOUGH the Indian population is small, a very significant proportion of the deaths from tuberculosis in Canada has occurred in this population. The figures are startling. In British Columbia, where the Indian population is less than 5 per cent, one-third of all the deaths occurred in this group. In Saskatchewan 104 deaths occurred among 13,000 Indians. If the Indian deaths be deducted from the total in Saskatchewan, the rate in that province would fall, according to the most recent figures (1938), from 29 per 100,000 to 18 per 100,000. In Manitoba 131 deaths of the total number, 349, were Indians. Each province has a share of the Indian problem. Every tuberculosis death represents a focus of infection with from eight to ten latent or actual cases. Such an estimate is conservative and the danger of transmission from the Indian to the white population is very real.

The Indian is the ward of the Dominion Government. Reserves are outside Provincial direction and the program of treatment and control is conducted by the Department of Mines and Resources, through its Indian Affairs Branch. Dr. P. E. Moore, in his review of the progress which is being made, refers to the meeting which was held in Ottawa in 1937 when representatives of the Canadian Medical Association and the Canadian Tuberculosis Association discussed with the Minister and officials of the Indian Affairs Branch the problem of control. That meeting stands as an example of what can be accomplished by co-operation. There has been a clearer understanding of the real difficulties which face the Branch in its efforts to treat and prevent tuberculosis in Indians. The amount of money which has been expended over the years for medical care, including tuberculosis treatment, is large and indicates the desire of the Dominion Government to meet the need. The Government is to be congratulated on the advanced program which it has undertaken, as evidenced not alone by an increase in expenditures, for the treatment of tuberculosis, of nearly $150,000 a year, but by the fact that over 650 Indians received sanatorium treatment during 1939-40 and that

$100,000 is being spent in making more beds available. These achievements are evidence of the forward-looking policy which the Branch is now able to follow through the support of the Federal Government. In Saskatchewan studies of BCG vaccination are being made in a suitable residential school, under the direction of Dr. R. G. Ferguson. It is encouraging, too, to learn from the extended experience of the officers of the Branch that fears regarding the reluctance of the Indian to accept treatment are groundless and that on the whole there is little more difficulty in keeping Indians than white persons in sanatoria.

There is much still to be done and there is urgent need for further strengthening of this branch of the Dominion Government in order that progress commensurate with the problem may be made in the near future and the danger of such foci of infection be minimized.

THE PHYSICIAN AND VENEREAL-DISEASE CONTROL

VENEREAL-DISEASE control in Canada requires active efforts on the part of every province. In the United States, Surgeon General Parran has estimated that probably only ten per cent of persons infected with syphilis are under treatment. In a recent paper, Dr. Jules Archambault, director of the Division of Venereal Diseases in the Ministry of Health of Quebec, estimated that there are 12,000 cases of syphilis under treatment in that province. If the estimate of Dr. Parran be used, the number of syphilitics in that one province would be approximately 120,000.

Legislation is of first importance in the efforts to control venereal diseases. In this issue, Dr. Pequegnat, Deputy Medical Officer of Health of Toronto, reviews, from the standpoint of the physician, the present effective legislation in the Province of Ontario. Since the first drafting of legislation in Canada in 1918, when the Venereal Diseases Control Act of Ontario was placed on the statute books, each province has enacted legislation having as its objective the treatment of infected persons until they are at least non-infectious. In the past twenty years it has become evident that legislation, to be still more effective, must provide for the complete treatment of every case. The amendments made to the Ontario Act last year included such a step forward; moreover, in addition to giving the Provincial Department of Health a more accurate picture of venereal diseases in the province, the revised legislation brings the Department of Health closer to the notifying physician, enabling it to assist medical officers of health and physicians in dealing with recalcitrant cases. The number of cases known to the Department during 1940 exceeded considerably the number reported in preceding years. As Dr. Pequegnat states, no physician is required to treat a case of venereal disease, but if he accepts a patient it is his duty to comply whole-heartedly with the requirements of the legislation and do his part in forwarding the efforts for the control of these diseases.

ASSOCIATION NEWS

The Canadian Health Conservation Contests

GOOD public health is the result of a wide-awake and responsive public, a thorough understanding of health problems and needs, and a health-department staff equipped both with modern scientific knowledge and the facilities with which to put this knowledge to use. The Health Conservation Contests endeavour to utilize the resources of the community to develop sound public health work, to promote needed improvement in health services, and to assist in the reduction of preventable illnesses and unnecessary deaths.

The Rural Health Conservation Contest was introduced in Canada in 1937, under the sponsorship of the Canadian Public Health Association and the American Public Health Association, and with the financial support of the W. K. Kellogg Foundation of Battle Creek. So enthusiastic was the response of the full-time rural health units eligible for participation that the Association felt that the opportunity for participation in a similar contest should be afforded to cities. Consultation with medical officers of many cities indicated that they felt such a step should be taken, since during the critical days of war it is more important than ever that health departments be maintained and strengthened. Accordingly, with the co-operation of the American Public Health Association and the financial support of the Metropolitan Life Insurance Company, the first Canadian City Health Conservation Contest was announced last summer. The contest is open to cities of 10,000 population and over. The response has been encouraging: nineteen cities have submitted formal notice of their participation and a number of others will, it is expected, do so before the closing date. The cities which have enrolled are as follows:

British Columbia: Vancouver.
Alberta: Calgary and Edmonton.
Manitoba: Brandon and Winnipeg.
Ontario: Hamilton, Kingston, North Bay, St. Catharines, Stratford, Toronto, and Windsor.
Quebec: Hull, Lachine, Montreal, Three Rivers, Verdun, and Westmount.
New Brunswick: Saint John.

Interest in the Rural Contest, introduced four years ago, is being maintained. Twenty-nine units have enrolled in the 1940 Contest, an increase of five over last year. For the Rural Contest, Canada is divided into two geographical groups, Quebec and the Maritime Provinces, and Ontario and the West. The following units have submitted formal notice of their participation:

Quebec: Argenteuil, Arthabaska, Beauce, Berthier, Brome-Missisquoi, Champlain, Chateauguay-Huntingdon, Drummond, Kamouraska-L'Islet, Labelle, Lac St. Jean-Roberval, L'Assomption-Montcalm, Laviolette, Maskinongé, Mégantic, Nicolet, Papineau, Riviere du Loup-Temiscouata, St. Hyacinthe-Rouville, St. Jean-Iberville-Laprairie-Napierville, St. Maurice, Shefford, Terrebonne, and Joliette.
Manitoba: St. James-St. Vital Health Unit.
Alberta: Foothills Health District; Red Deer Health District.
British Columbia: Peace River Health Unit; North Vancouver Health Unit.

Advisory service is available, on request, to participating units. We are fortunate in having with us Dr. James Wallace, who until his retirement last October was Associate Field Director of the American Public Health Association and has given much of his time to the Canadian Rural Health Conservation Contest since its introduction four years ago. During the fall and winter Dr. Wallace has visited the following cities and units:

Cities: Three Rivers, Hull, and Verdun, Que.; Fort William, North Bay, Pembroke, Port Arthur, and Sudbury, Ont.; Brandon and Winnipeg, Man.; and Regina, Sask.
County Health Units: Argenteuil, Arthabaska, Berthier, Brome-Missisquoi, Champlain, Drummond, Joliette, L'Assomption-Montcalm, Laviolette, Maskinongé, Nicolet, Papineau, Richelieu, St. Hyacinthe-Rouville,

St. Jean-Iberville-Laprairie-Napierville, St. Maurice, Shefford, and Terrebonne, Que.; Prince Edward Island; St. Boniface and St. James-St. Vital, Man.

The preparation of the questionnaire form, known as the "fact-finding schedule", provides a relatively simple method of assessing the community health program. Even though the city or county may not receive an award, it will obtain what is much more important: an intelligent knowledge of its health problems, a commendation from the Grading Committee of its health achievements, frank analysis of its weaknesses, and suggestions for improvement.

THE CHRISTMAS MEETING OF THE LABORATORY SECTION

THE ninth Christmas meeting of the Laboratory Section was held in the Royal York Hotel, Toronto, on December 16th and 17th. One hundred members were present, including representatives of the Department of Pensions and National Health, the Department of National Defence, and the Department of Agriculture, Ottawa; the Departments of Health of British Columbia, Alberta, Manitoba, Ontario, Quebec, and Nova Scotia; the University of British Columbia, the University of Alberta, the University of Saskatchewan, the University of Western Ontario, the University of Toronto, Queen's University, the University of Montreal, McGill University, and the University of Pennsylvania; Mountain Sanatorium, Hamilton, the Hospital for Sick Children, Toronto, the Toronto General Hospital, the Toronto Military Hospital, the Royal Victoria Hospital, Montreal; the Ontario Research Foundation and the Ontario Veterinary College; and the New York Agricultural Experiment Station.

Twenty-nine papers were read during the two days, and one afternoon was given to the presentation of sixteen demonstrations of laboratory methods. The attendance at the annual dinner was the largest in the history of the Christmas meetings, almost all the registered members being present. The speakers were Dr. M. V. Veldee, Chief of the Division of Biologics Control of the National Institute of Health, Washington, and Dr. Ronald Hare, Research Associate in the Connaught Laboratories, University of Toronto. Abstracts of the majority of the papers will be published in the February issue, and a number will be published in full in subsequent issues.

The following officers were elected for 1941: chairman, Dr. C. E. Dolman, Vancouver; vice-chairman, Dr. D. J. Mackenzie, Halifax; secretary, Dr. Ronald Hare, Toronto; Section council, Dr. G. D. W. Cameron, Ottawa, Mr. M. H. McCrady, Montreal, and Dr. R. M. Shaw, Edmonton; local committee, Dr. D. T. Fraser, Dr. P. H. Greey, and Dr. A. L. MacNabb.

DIRECTORY OF LABORATORY PERSONNEL

COPIES of the 1941 Directory of bacteriologists, pathologists, and chemists engaged in public health work in Canada are available without charge from the Association's office. The directory, a publication of the Laboratory Section, lists the names and professional addresses of two hundred and thirty-five workers in the laboratory field.

EDUCATIONAL QUALIFICATIONS OF CANDIDATES FOR THE EXAMINATIONS FOR THE CERTIFICATE IN SANITARY INSPECTION

AFTER August 31, 1941, candidates for the examinations for the Certificate in Sanitary Inspection (Canada) will be required to have completed four years of high-school work or its equivalent in secondary-school education. The present requirement is three years of high school or its equivalent. The introduction of this regulation will advance the Committee's objective of gradually improving the educational background of the Canadian sanitary inspector and the quality of the service which he can give.

BOOKS AND REPORTS

The Changing Front of Health. *Milbank Memorial Fund, New York, 1940. 97 pages.*

THE CHANGING FRONT OF HEALTH presents the proceedings of the Milbank Memorial Fund at its eighteenth session in New York City. The leading authorities of public and educational health centres met to discuss present and future health trends in America. It is evident that the need is not for more surveys but an adequate application of known accepted facts to the nation's betterment. Problems rather than progress dominated the report.

Following an introduction by Dr. Frank Boudreau, the brochure is divided into four parts: *Public Health Standards in Housing*, by Henry F. Vaughan; *The Relation of Diet and Nutrition to Public Health*, by Allen W. Freeman; *Results Obtained on the Medical Appraisal of the State of Nutrition*, by Thomas Parran; *Population Trends and Programs of Social Welfare*, by Frederick Osborn.

The significant note in Dr. Vaughan's summary on housing standards is an appeal to the medical officers of health to assume a more active interest in housing as a health problem. In addition attention was drawn to the necessity for considering the social reaction of the individual housed. Public health is a social science and not merely an association of physicians and engineers.

Dr. Freeman stressed the present shortage of trained nutritionists. Medical students, nurses, and health departments are not yet fully aware to the importance of this science. Public health demonstrations are superior to the pseudo-scientific magazine advertising which floods the public on this subject. Malnutrition continues to be a joint problem of poverty and ignorance.

Dr. Parran, quoting from a small series of American local surveys, revealed that in the populations examined and with due correction for age and sex standards, 90 per cent of those surveyed were receiving a diet deficient in calories; 25 per cent showed vitamin A deficiency; 11 per cent were deficient in vitamin C; 20 per cent were receiving below normal protein requirement; hemoglobin estimations and red cell counts were 26 per cent and 44 per cent respectively lower than current minimal standards; nearly 90 per cent of the children showed dental caries. One is led to wonder how representative these figures are of the entire American population where health education is constantly before the reading public.

The section report summarized by Dr. Osborn on population trends is perhaps the most arresting part of the entire session. Prediction that the group over 65 years of age will probably more than double itself in the next thirty years emphasizes the social and economic load which will fall on the shoulders of the young and middle-aged groups in the next generation.

Steps to prolong the productive years of the over-65-year group are urged. No mention was made of the possible intensification of this population shift which would eventually occur should America go to war to defend its present order. The birth rate is not encouraging and a population policy may have to be publicly promoted.

J. L. Little

Pocket Pronouncing Medical Dictionary. *By George M. Gould. 11th ed., revised, 1939. Philadelphia: P. Blakiston's Son & Co., Inc. 1,000 pages. Flexible, washable fabric, $2.00; with thumb index, $2.50.*

A BOOK which has reached its eleventh edition, seventy-fifth printing, and sales approaching 900,000 copies, as this Pocket Medical Dictionary has, recommends itself. The need for constant revision in view of the ever-changing and advancing na-

ture of medical and allied sciences and their terminology has been kept uppermost in mind. Indeed, by the time a new edition has reached the public, it is again in arrears. For example, in this volume the terms sulfanilamide and prontosil appear but the newer compounds sulfapyridine and sulfathiazole, to mention only two, are not included.

The contents of this edition include over 40,000 medical words with their pronunciation and definition. Many of these appear for the first time. In addition there are ninety tables in which are listed the names of arteries, bones, muscles, nerves, hormones, pathogenic micro-organisms, and other useful information. One such table enumerates drugs and indicates their dosage and incompatibilities. This is more than a pocket dictionary; it is a convenient reference book on many subjects and thus continues to serve the medical profession in a very capable manner.

F. O. Wishart

Bacteriology of Public Health. *By George M. Cameron, Ph.D. St. Louis: The C. V. Mosby Company, 1940. Canadian agents: McAinsh & Co. Limited, Toronto. 451 pages, illustrated. $4.00.*

IN this book the facts of bacteriology relevant to public health are brought together. This treatment, in which both subjects are correlated and receive emphasis, is new.

The opening chapters, "Historical Review" and "The Development of Knowledge," are adequately and interestingly presented. On the other hand, the treatment of certain subjects leaves something to be desired. The pathogenicity of *E. coli*, which is of low degree, is discussed at length. Streptococcal infections, a difficult topic admittedly, are treated at considerable length but one does not obtain a very clear impression of the author's ideas or of recent thought on the problems. In regard to food, the old bogey of ptomaine poisoning is retained. It is gratifying, however, to find that the role of staphylococcal enterotoxin in food poisoning is given due recognition.

Virus experts will no doubt be surprised to read that: "Absolute proof that streptococci are the specific primary cause of measles is still lacking although the evidence is strongly positive." They will also be disappointed to find that the etiology of influenza is discussed without mention of the monumental work of Smith, Andrewes, and Laidlaw.

In general, recognized measures of control and prevention are clearly set forth and their rationale made evident by the bacteriological discussions. There are omissions, however, as in the case of tularaemia. One surprising feature is that no mention is made of sulfanilamide and kindred compounds in outlining the treatment of pneumonia, gonorrhoea, meningitis, and streptococcal infections.

While the book is too restricted in scope to be suitable for medical or advanced classes, it should prove useful for elementary students.

F. O. Wishart

The 1940 Year Book of General Medicine. *Edited by George F. Dick, J. Burns Amberson, George R. Minot, Wm. B. Castle, Wm. D. Stroud, and George B. Eusterman. Chicago: The Year Book Publishers, 304 East Dearborn Street. 934 pages. $3.00.*

CONGRATULATIONS are due the publishers of the Year Book on this fortieth anniversary edition. It contains a most interesting account of the origin and development of the Year Book and of the men whose efforts and contributions established its success. Each division of the book is preceded by a hitherto unpublished article by the various editors on a subject in their respective fields.

Members of the medical profession are assured of finding valuable information on many subjects, including influenza, tetanus toxoid, and chemotherapy. More than seventy disease conditions are covered in 567 ab-

stracts. Frequent editorial comment aids greatly in evaluating the different articles.

F. O. Wishart

Insect Pests. *By Wm. Clunie Harvey, M.D., D.P.H., M.R.San.I., and Harry Hill, M.R.San.I., A.M.I.S.E. London: H. K. Lewis & Co. Limited, 1940. 292 pages with 23 illustrations. 10s. 6d. net.*

INSECT PESTS is a small but informative book on a subject which despite its importance has been somewhat neglected.

The text provides a general outline of insect control together with detailed information regarding the more common insect pests. The principles and practice of disinfestating are discussed. Special reference is made to methods used in building construction to prevent infestation, to gaseous fumigants, application of sprays and powders, superheating, steam disinfection, and the use of soap and water. This is followed by a comprehensive account of the technique of fumigation of premises and furniture by several types of gaseous fumigants.

Insect control and educational measures, legislative control in England, human toxicology of disinfestation agents, disinfestation of foodstuffs and ships are also discussed in detail. Sufficient descriptive information regarding the more common insect pests is given so that their recognition, without previous experience, is made easy.

This book should be readily available to all public health workers. To the sanitary inspector especially, it will be of great value. It presents clearly the essential problems involved in the control of insect pests and the appropriate control measures.

F. M. R. Bulmer

Congenital Malformations. *By Douglas P. Murphy, M.D., F.A.C.S. Philadelphia: The University of Pennsylvania Press, 1940. 98 pages. $2.00.*

THIS book presents the results of a study of the frequency of malformations among siblings in families in which there was at least one congenitally malformed child. The study families were located through a search of the files of birth and death certificates in the Bureau of Vital Statistics in the State Department of Health of Pennsylvania. Philadelphia families in which malformed children had died during the five years ending December 31, 1933, were used, in order to make it feasible to visit the homes in question.

Conclusions are limited in significance by reason of the methods of necessity employed. The sample studied is one of families in which at least one malformed offspring was found and statements such as "In families already possessing a malformed child, the birth of a subsequent malformed offspring takes place with a frequency twenty-five times greater than that of the general population", are apt to be misconstrued.

The study represents a rather unusual effort both in method and objective; and notwithstanding the sort of limitation implied by the basis of the study, considerable useful information has been secured by the investigation.

A. Hardisty Sellers

CURRENT HEALTH LITERATURE

These abstracts are intended to direct attention to articles that have appeared in other journals during the past month. Any of the journals referred to may be borrowed for three days or longer if desired. Address requests to the secretary of the Editorial Board.

The Prevention and Control of Tuberculosis in Australia: Statement Adopted by the National Health and Medical Research Council

A VERY far-sighted and comprehensive scheme for the prevention and control of tuberculosis is outlined in this statement. The important points are summarized as follows:

1. The work of tuberculosis clinics in relation to the homes in which tuberculosis exists should be supplemented by wider employment of the Mantoux test, X-ray examination, and bacteriological diagnosis and control by direct cultivation.

2. The control measures in the general community should include: (*a*) mass surveys in certain age-groups (0-5 years and 15-30 years); (*b*) special surveys in certain industries and occupations.

These surveys should employ: (i) routine Mantoux testing; (ii) routine X-ray examination of positive reactors, using miniature radiography; and (iii) bacteriological diagnosis and control by direct cultivation.

3. A large increase in accommodation for treatment will be necessary.

4. A system has been outlined, comprising chest hospital plus tuberculosis clinic working in conjunction with sanatoria, preventoria, and industrial colony.

5. Careful attention is necessary to aspects of nutrition and environment of patients and contacts, and suitable provision should be made for this.

6. Special precautions should be taken to prevent contraction of disease under special hazards. Suggested precautions in relation to nursing trainees are set out.

There is much food for thought in these recommendations for all concerned with anti-tuberculosis programs.

Med. Officer, 1940, *64*: 133.

Cerebrospinal Fever: Analysis of 124 Cases

THIS study concerns cases of cerebrospinal fever (meningococcal) at the Military Hospital, Aldershot, during the winter of 1939 to the end of May, 1940. The features discussed and analysed are onset and incidence, symptoms and clinical findings, pathology and bacteriology, differential diagnosis, course of the illness, and treatment. The onset was characteristically sudden with headache, fever and vomiting. The disease pattern in general differed somewhat from that of the 1914-18 type and its description is therefore of special interest. Of the 124 cases, 87 were in the age-group 19-22 inclusive. In treatment, soluseptasine, sulphapyridine, sulphapyridine soluble or sulphanilamide or some combination of these drugs proved very effective, soluseptasine particularly so. The mortality rate for the 124 cases was 3.2 per cent and including 11 subsequent cases, only 2.9 per cent.

R. W. Cushing, Brit. Med. J., p. 439, 1940.

Therapeutic Procedures for Scarlet Fever

A CONTROLLED study was undertaken in an attempt to determine the value of sulphanilamide and scarlet fever antitoxin singly and in combination in combating the initial toxic phase and preventing complications in scarlet fever. The findings from a series of 293 patients are reported and the observations, pro and con, of other workers in the field noted. In brief, the study showed that sulphanilamide had little or no effect on the initial phase of the disease, reducing neither the toxicity nor the duration of the fever. On the other hand, the initial or toxic phase was noticeably and promptly shortened by antitoxin or

convalescent serum. The effect of sulphanilamide on the incidence and treatment of complications in this series was inconclusive but the authors feel that in view of other favourable reports the drug should be given in severe and moderately severe scarlet fever until more definite opinion to the contrary becomes justified.

H. Rascoff and S. Nussbaum, Am. J. Dis. Child., 1940, *60*: 552.

Typhoid Vaccine Studies

THIS report is a continuation of studies from the Laboratories of the Army Medical School, Washington, D.C., and includes important observations on duration of immunity following vaccination and revaccination in addition to further findings in regard to intracutaneous injection of typhoid vaccines.

Three groups were revaccinated. The first group received 0.1 cc. of vaccine intracutaneously; the second group 0.5 cc. subcutaneously; the third group a "standard course" of 0.5 cc., 1.0 cc. and 1.0 cc. of vaccine at weekly intervals. The mouse protection test was used to titrate their sera before and after the revaccination and the antibody response to the three methods was found to be of much the same order. Reactions to the vaccine were much less marked when given intracutaneously and this route appears to be the one of choice.

The protective antibody content of blood sera from a group of normal children and a group of normal adults (with a negative history of typhoid fever and typhoid vaccination) was estimated by the mouse protection test and there was evidence of acquired immunity in some of the adults. Similar estimations were carried out on the blood sera of convalescents from typhoid fever and of typhoid carriers and in all of these strong protective power was found. Using these observations, an arbitrary level of protective antibody was chosen as indicating satisfactory immunity and this yardstick was applied in a study of the duration of immunity following vaccination and revaccination. After primary vaccination, 20 per cent had less than this arbitrary level by the end of twelve to eighteen months and at the end of three years this had risen to 57 per cent. Revaccinated individuals retained a higher level of immunity for a longer time. It is recommended that revaccination be carried out at one-year periods and that the interval should never exceed two years.

D. Longfellow and G. F. Luippold, Am. J. Pub. Health, 1940, *30*: 1311.

An Outbreak Due to the "Newcastle Dysentery Bacillus"

THIS paper records an outbreak of dysentery due to an organism whose pathogenicity has hitherto been held in question. The outbreak occurred in a hospital in New York City and totalled 97 cases, the majority of whom were nurses. The Newcastle dysentery bacillus was isolated in 79.4 per cent of the cases and in addition from 23 healthy carriers. In the bacteriological studies coli-inhibiting media, desoxycholate citrate agar, permitted the isolation of the organism from the faeces of carriers and others where less selective media failed to detect them. Agglutination tests with the sera of cases and carriers showed specific antibody titres well above that found in controls. Epidemiological investigation demonstrated that all cases were among those who regularly ate food prepared in the nurses' kitchen. The particular article of food serving as the vehicle of infection was not identified but was apparently salad dressing which had been contaminated by an undetected carrier.

Clinical signs and symptoms were carefully noted and are recorded in order of frequency. The illness was generally more severe than that due to infections with *Shigella dysenteriae* Flexner or Sonne and differed somewhat from these clinically, particularly in the amount of constitutional disturbance.

A. V. Hardy, S. Frant, S. W. Jarcho, and E. G. Schlosser, U.S. Pub. Health Rep., 1940, *55*: 2101.

INDUSTRIAL HYGIENE ABSTRACTS

Medical Service in Industry

TODAY in many business organizations medical supervision over employees, materials, processes, and working conditions has been found to be a practical necessity. With this realization comes the greater demand for the service of physicians as a means for conserving the health of workers.

This interest in workers' safety and health is becoming so widespread and is being evidenced by so many agencies, as manufacturers' associations, trade unions, insurance carriers, etc., that the necessity for medical organizations to influence industrial health standards is very apparent. It would not be in accordance with medical tradition to allow any extraprofessional agencies the leadership in a program involving public health. The Council on Industrial Health of the American Medical Association was established as a means of focusing attention from all elements in the medical profession on industrial health problems. They believe that the needs for medical service, particularly in small plants, represent a considerable opportunity for medical achievement. To encourage and control this demand they advocate the establishment of an educational service to acquaint physicians with the special character of this industrial work and to convince employer and employee of the value of a medical service that is soundly organized and that is satisfactory not only to those who provide the service but also to those who receive it.

Co-operating committees on industrial health are being organized in state medical associations where such a step seems justified. A program has been developed with the following objectives: (1) to train industry and labour to the value of industrial health conservation; (2) to develop a clear understanding of the proper scope and functions of industrial medicine and to clarify relationships between private and industrial practice; (3) to keep the medical profession informed about all accepted methods for reducing the frequency and severity of industrially induced disability; (4) to elevate medical relations under workmen's compensation; (5) to scrutinize all legislation affecting the health of industrial workers; (6) to improve relationships between medicine and insurance; (7) to establish working relationships with all agencies in the state interested in industrial health; (8) to arrange for the adoption of similar activities through co-operating committees in the medical societies of the industrial counties.

J.A.M.A., 1940, *115*: 1099.

Some Medical Aspects of Chemical Warfare Agents: A Review

THE technique of modern chemical warfare makes it essential that civilians, and particularly civilian physicians, have a knowledge of chemical warfare compounds. Realizing that the number of gas casualties is always inversely proportional to the character of "gas discipline" (previously trained personnel), European countries have for some years given training to both medical and non-medical persons. In this review the authors emphasize the more important points of the medical aspect of such warfare, especially as it relates to the civilian physician.

A table is given which presents some clinical aspects of the more important chemical warfare agents. These can be classified physiologically into five groups: (1) lacrimators, (2) lung irritants, (3) vesicants, (4) sternutators, and (5) nerve and blood poisons. The more important from the point of producing casualties are the lung irritants and the vesicants. The authors stress the necessity for previously arranged special treatment centres. Adequate treatment cannot be given in an ordinary first-aid sta-

tion. They discuss the treatment of casualties in which pulmonary damage and skin burns have been incurred and of poisoning by means of blistering agents, as well as decontamination of clothing and of food and water supplies.

A brief summary is given of the materials required in the treatment centre and of the precautions necessary in the care of patients. Reference is made to special problems such as the treatment of persons affected by blistering gases, who also have wounds requiring surgical treatment, the medical care of chemical warfare casualties produced on board ship, and the hazards encountered in the manufacture of the chemical agents. Other aspects included in the report are incendiary agents, the residual effects of chemical warfare agents, and the detection of such agents.

The authors maintain that with an understanding of such knowledge in advance, the existing unwarranted fear of chemical warfare, which has been largely induced by propaganda, can be driven away and that the number of casualties from these chemical compounds can be reduced.

Leon Goldman and Glenn E. Cullen, J.A.M.A., 1940, *114*: 2200.

An Outbreak of Dermatitis from New Resin Fabric Finishes

IN the spring of 1940 an outbreak of dermatitis occurred in Canada among persons wearing cotton fabrics finished with a preparation made by a large American chemical manufacturing company. Investigation showed that the actual irritant was an acid ester gum, one of the chief ingredients in this modern finish.

While this investigation was under way, seemingly separate outbreaks of dermatitis, caused by wearing apparel of different types, occurred in different parts of the United States. In Missouri and other parts cases were reported from "shorts" sold in chain stores. These garments consisted of cotton dyed in various combinations, and finished. In South Carolina dermatitis occurred among girls sewing and handling cotton fabrics manufactured in one of the South Carolina mills. From Indiana first and then from other sources reports came of dermatitis occurring among women wearing hosiery made from a new synthetic fibre substitute for silk. Immediately following notification of each outbreak, the United States Public Health Service conducted an investigation to discover the actual cause, with the result that all outbreaks were found to be due to a common cause, the same preparation which had been responsible for the trouble in Canada. As a result this finish is no longer recommended by its manufacturers for use on wearing apparel.

Finishes are placed on fabrics to give them a better appearance and better wearing properties but their stay is more or less temporary as the first laundering of the article usually removes a large proportion of the finish. The authors of this article recommend that all new underwear, stockings, etc., that touch the skin, be laundered before wearing. Furthermore they maintain that manufacturers of new chemicals or combination of chemicals should have them tested in a toxicologic laboratory and should acquaint their customers with the results. In addition to this, manufacturers should not place apparel containing new substances of unknown toxicologic properties on the market before testing the effect of these chemicals on the human skin. A standard test for determining these facts is proposed.

Louis Schwartz and others, J.A.M.A., 1940, *115*: 906.